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Volume 4 Number 11
\$2.95

May 28, 1985

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PC
NEWS:
AT&T 7300
AND COMPAQ TC



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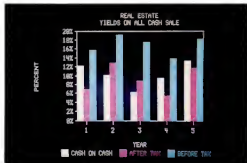
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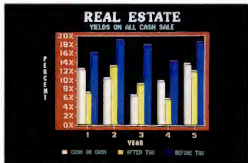
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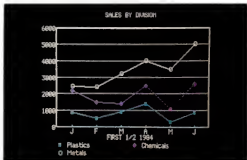
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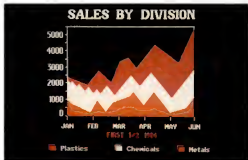
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Memory required to load full product	256K RAM	320K RAM	384K RAM
"Snapshot" screens to custom-make separate presentation disk	Yes	No	No
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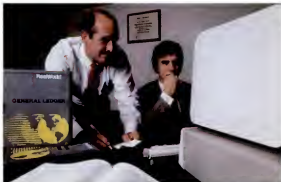




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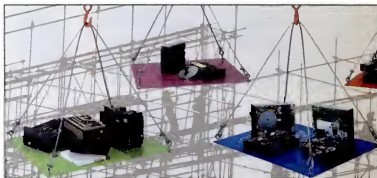
Type of Business

PC85045



The Independent Guide to
IBM Personal Computers

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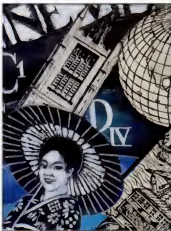
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Fifteen pages of up-to-the-minute reports, interviews, minireviews, and useful tips, along with entertaining tales, fables, and juicy scoops from the computer community.

In this issue of PC News, we give you all the details about:

- ♦ The state of the IBM compatible market.
 - ♦ A surprise from Lotus and the memory manufacturers—bankswitching.
 - ♦ A bait-and-switch scandal brewing in the hard disk business.
 - ♦ IBM's Japanese computer, the PC IX.
- In addition, we'll explore the market for pirated software in Singapore. We'll let you follow a long conversation with microcomputing pioneer, Adam Osborne. And we'll take a look at a half-dozen new business packages.

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A quick reference guide to various services, hardware, software, and accessories for PC owners and soon-to-be owners.

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Nancy Andrews / *Assembly Language Safari on the IBM PC: First Explorations and 8086/88 Assembly Language Programming* are two tomes that can be used together to teach you all about assembly language programming. The former teaches by example, while the latter stresses the basics.

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Cover Photograph: Dennis Kitchen

Compare the Hercules Color Card to IBM's.

Five reasons why the Hercules Color Card is better.



IBM Color Adapter \$244



Hercules Color Card \$245

- | | | |
|------------------|--|---|
| 1. Compatibility | Runs hundreds of graphics programs. | Runs the same hundreds of graphics programs. "The Hercules Color Card is so nearly identical to the IBM Color/ Graphics Card that it's almost uncanny." PC Mag. |
| 2. Printer port. | None. | Standard. Our parallel port allows you to hook up to any IBM compatible printer. |
| 3. Size. | 13.25 inches. Limited to long slots. | 5.25 inches. Fits in a long or short slot in a PC, XT, AT or <i>Portable</i> . |
| 4. Flexibility. | Can't always work with a Hercules Graphics Card. | Always works with a Hercules Graphics Card by means of a software switch. |
| 5. Warranty. | 90 days. | Two years. |

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PC PAINT



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The Edge



The Plain Facts:

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• IBM Monochrome Compatible, 720x348, High Resolution	✓		✓	✓		✓
• Runs Lotus 1-2-3™ and Symphony™ in high resolution monochrome:	✓		✓			✓
— 132 columnsx25 rows	✓			✓		
— 132 columnsx44 rows	✓			✓		
• PC Paintbrush in monochrome	✓		✓			✓
• 16 shades of green on the IBM monochrome monitor	✓	✓				
• Runs color software on the IBM monochrome monitor, full screen:	✓	✓				
— Flight Simulator	✓	✓	✓			
— PC Paintbrush	✓	✓	✓			
— PC Paint	✓	✓	✓			
— PC Tutor	✓	✓	✓			
— Pinball	✓					
— Without software patch needed	✓					
• Automatic Boot-up without software patch needed	✓		✓			✓
• Runs Lotus 1-2-3™ and Symphony™ in high resolution color:	✓		✓			
— 16 colors, 320x200	✓		✓			
— 4 colors, 640x200	✓		✓			
• Printer port (standard)	✓		✓	✓	✓	✓
• Software switchable among color, monochrome and 132 columns mode	✓		✓			
• Price	\$399	\$395	\$695	\$680	\$595	\$499

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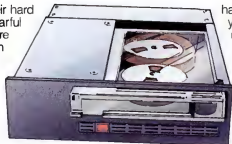
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Includes alarm clock with constant time display	Yes	No	No	No
Date and time "stamp" for documents	Yes	No	No	No
Stopwatch/elapsed time feature	Yes	No	No	No
Individual message displayed when alarm goes off	Yes	No	No	No
Can run programs at set times	Yes	No	No	No
Calculator with printable on screen tape display	Yes	No	No	No
Types of calculators included	Standard AND Financial	Standard	Standard	Standard
Number of calculator memories	10	1	1	1
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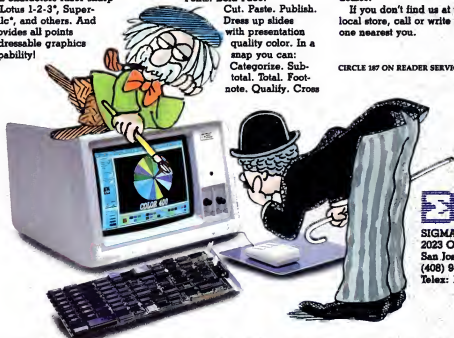
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Ven-Tel gives you lots of reasons to buy our Half Card™ modem for your IBM PC or compatible. The Half Card™ is a complete system that lets you communicate with other PCs, mainframes, and databases effortlessly. It includes Crosstalk-XVI® software. It's reliable. It's got all of the features you want. And it's a good value.

Do You Own One of These Computers?

Chances are you do. And if you're thinking of buying a modem, consider the Half Card™. Because of its small size, the Half Card™ fits in more computers, including all of the models we've listed here. The Half Card™ is small, so it fits in short slots or long. That means you can save your long slots for other expansion uses.

Effortless Communication

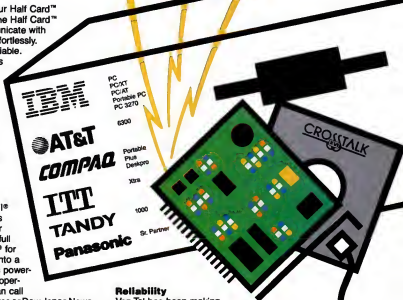
Each Half Card™ comes with Crosstalk-XVI® communications software, by Microstuf. It's the easiest to use, whether you're a beginner or an old hand, and the most powerful. A full on-line help menu makes using Crosstalk® for the first time a snap. It can turn your PC into a terminal on a mainframe computer with its powerful terminal emulation feature. It will even operate your PC when you're not there. You can call into an information service such as The Source or Dow Jones News Retrieval, or transfer files and electronic mail, all at the touch of a button. The Half Card™ connects your computer to the world. Effortlessly.

More Modem for Your Money

When you buy the Half Card™, you don't need anything else. The Half Card™ is a complete communications package that includes a full-featured modem and the best known software on the market. Complete easy-to-understand instructions with full technical support on installation and use. And a very competitive price. The Half Card™ with Crosstalk-XVI® software, retails for only \$549.

Features

- 1200/300 baud auto-dial, auto-answer.
- Uses the industry standard "AT" command set.
- Runs with virtually all communications software, including Smartcom II and PC Talk III and integrated packages such as Symphony and Framework.
- Includes Crosstalk-XVI® software.
- On-board speaker and extra phone jack for easy switching from voice to data mode.
- Selective tone or pulse dialing; full or half duplex.
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- True ring or busy signal detection.



Reliability

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You can get the Half Card™ at ComputerLand, Businessland, the Genra Group, Entré Computer Centers, Macy's Computer Stores and other fine dealers nationwide. Also from Ven-Tel: the 1200 Plus™, an external modem and the PC Modem 1200™, an IBM Internal with V.22 International capability.



Effortless Communication
Ven-Tel Inc.

2342 Walsh Avenue
Santa Clara, CA 95051
(408) 727-5721



What's Inside

The Spreadsheet Face-off was a huge success thanks to many staff members, especially editorial assistant Dave Baker, who went beyond the call of duty in his efforts to overcome Murphy's Law.

Editorial assistant Dave Baker, the general factotum of *PC Magazine's* Toy Shop, monitors the coming and going of various microcomputer-related products. He also monitors most of the major projects organized by the magazine—and the varying levels of confusion among the staff in charge. And, because Baker is such an accommodating person, he occasionally gets mixed up in chaotic events—as he eventually did at the *PC Magazine* Spreadsheet Face-off.

Baker was only supposed to have minimal involvement in the face-off. It was his job to call the software companies and make sure they sent the latest version of their programs on time. After that, the job of organizing and overseeing 29 industrious M.B.A. students as they competed to solve intricate spreadsheet problems would be out of his hands.

Until editor Bill Machrone came up with an idea.

A Little Spice

"Let's jazz up the proceedings a little," Machrone told public relations manager Jessica Kersey. "Let's give out the main part of the test in a locked briefcase. We can then give them the combination and say, 'Ready, set, go!'"

Kersey thought it was a marvelous idea, one that would add a little more spice to the contest. She had just joined the staff of *PC Magazine* a month before and had hardly gotten used to her first microcomputer when she found herself in the midst of the hurricane called the Spreadsheet Face-off.



Actually, Kersey's first task was rather enjoyable: to find a suitable site for the event. Well-lit and adequately powered conference rooms were needed, as well as hotel rooms for all the participants. So, while Baker called leather goods stores in search of ten attaché cases, Kersey, technical coordinator Mike O'Cone, and associate editor Barbara Krasnoff spent a sunny and not very trying afternoon visiting and assessing plush New York hotels—including, of course, their refreshment facilities. They finally chose the Inter-Continental (formerly the Barclay) Hotel because of its old-world charm and well-supplied conference rooms. And according to Krasnoff, "Any hotel that features a large bird cage in its lobby can't be all bad."

In fact, things remained on a fairly civilized level until most of the Wharton stu-

dents had assembled in the *PC* hospitality suite the Friday night before the marathon. (The hospitality suite, an elegant living room/bedroom combination, somehow ended up registered under the name of Michael O'Cone. Of course, a few wisecracks made suggestions as to why he wanted to spend a couple of nights in the suite. O'Cone refused to comment.)

Everything was ready for the big event. Ten IBM PCs were sitting downstairs under guard, ten spreadsheet packages were waiting to be opened, and ten briefcases were being delivered to the hospitality suite under the proprietary gaze of Dave Baker.

Great Expectations

Most of the students had the impression that they were in for a fun weekend in New York City. One enterprising gentleman suggested to Krasnoff that it might be a "good PR stunt" to ship all the participants to Area (a popular night spot) Saturday night. Krasnoff demurred. She suggested that the young man might not have enough time to spend Saturday night on the town.

While all the socializing was going on in the living room area, an entirely different atmosphere prevailed in the suite's bedroom. Baker was frantic.

"I can't open some of the briefcases," he told O'Cone.

As it turned out, three of the locks were broken and wouldn't open for love, money, or a screwdriver. Because it is notoriously difficult to buy briefcases late on a Friday night, even in New York,

WHAT'S INSIDE

Baker was sent out the next morning with one of the briefcases in hand to try to find three more that matched.

When he finally returned from his quest, with three reasonably identical

briefcases in hand, Baker found that his job wasn't finished. The Spreadsheet Face-off had begun Saturday morning as scheduled, but problems were already rearing their ugly heads.

Hungry Pigeons

The students attacked the test questions like pigeons after a loaf of bread. While Ray Hood of MicroTrek, the consulting firm that designed the test problems, circulated among the participants, Kersey had her ear glued to a phone, talking to various press representatives, and O'Conne clutched his toolkit, waiting for disaster to strike.

O'Conne didn't have to wait long. As the tests proceeded, several rented PCs began to display neurotic tendencies.

Luckily, the PC crew had brought along their own machine. By the time O'Conne had finished borrowing parts from his machine to fix their's, PC's computer resembled the remains of some berserk hobbyist's nightmare. Baker was kept busy running for screwdrivers, preparing the cases for their presentation, and otherwise helping to keep the other three PC staff members reasonably sane.

Until yet another computer decided to quit at about 10 p.m. Saturday night, and the magazine's spare PC was in no condition to lend out any more parts.

O'Conne did some fast thinking. "You'll have to go back and get a machine at the office," he told Baker.

So Baker made a late-night excursion to the PC Magazine offices and left with the CPU of one of the edit department's IBM PCs. Since this is, after all, New York, the sight of a man walking around the streets at 11 p.m. with a computer under his arm did not excite any comments from passersby. (It did, however, somewhat surprise associate editor Jennifer de Jong, who came in Monday morning to find a lone keyboard on her desk.)

By the time Baker returned with the machine and helped O'Conne hook it up, the clock had rounded midnight. The editors-on-duty decided it would be wise to have Baker available in case further emergency forays were necessary, and so he was accommodated with his own room at the Inter-Continental. He was also able to join the rest of the PC staff in a general state of collapse Sunday night, when the whole event was over.

"But, in the end it was all worth it," Baker says. Isn't it wonderful how time heals all wounds? ■

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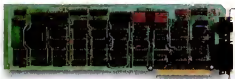
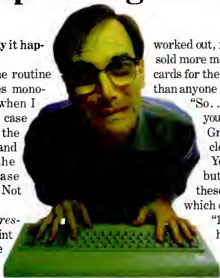
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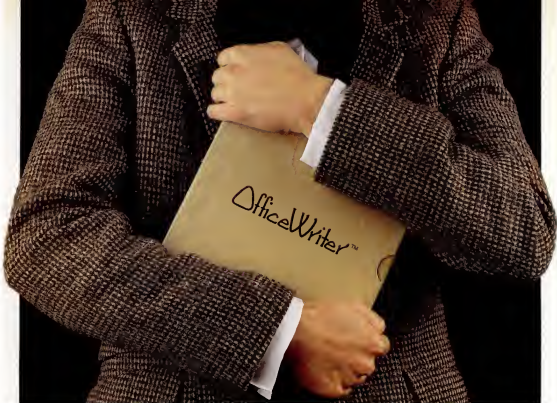
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with it.

Why has C undergone this C-change?
Because RUN/C is a C interpreter, and a very
full implementation of the language at
that. Until now, C has only been a compiled
language. If you already use C, you
know that means editing your program
with a text editor, saving the file, calling the
compiler to translate your program file,
finding the errors, and going back to the
editor again. Great galloping glaciers!

If Only 'C'

Were as Easy as BASIC

RUN/C is different. You can write and
run your program in tandem. Like BASIC, it
has a couple of dozen commands such as
LOAD, MERGE, SAVE, and FILES. It has an
editor. You can INSERT lines and EDIT
lines and LIST and DELETE lines on the
spot. The most commonly used commands
are built into the function keys, so you don't
have to spell them out.

Then just RUN. Your program executes
instantly. If an error halts it, RUN/C
explains why and where. You just EDIT the
line, then and there, and RUN again.

A Great Time Saver for C Professionals

If you are already a C user, you
undoubtedly sense the tremendous time
savings of getting out of the compiler loop.
You're probably been waiting for an
interpreter. Ultimately, you'll want to hand
your work to a compiler, for linking, for
speed of execution. But RUN/C gives you a
fast front end. It is a superb for listening away
at a cluster of functions until, proven
undestructible and suitable for acceptance
into the Great Project.

RUN/C lets a pre-processor and test code
rapidly, without heavy checking. No more
making things extra dry to Get-Ready-For-
The-Compiler, where a forgotten semi-
colon draws three minutes in the penalty

box. With RUN/C you can try out things
devil may care. Let it find your typos and
misprints. It's nothing to change them and
re-RUN.

An Ideal Way to Learn

If you are a newcomer to C, RUN/C
makes a splendid teacher. Its manual is as
big as all outdoors. It contains not just
instructions how to use RUN/C, but its
475-pages provide a thorough-going
demonstration of the C language itself.
Every feature of RUN/C.

- all the language keywords like "for" and
"while" and "case"
- all the built-in functions like "printf" and
"getc" and "puts" and "malloc"
- all of RUN/C's commands like "EDIT"
and "LIST" and "MERGE"
- all the data types like "char" and
"double"

— all are presented in a single alphabetical
procession across most of the book.

Each is accorded its own main chapter
with examples of how to use. Over 100 of
these chapters are devoted to RUN/C's
built-in functions, and every one lists a sample
program showing how it is used. These
sample programs are on the disk. So as you
read them in the manual, you can run them
on the screen, see what they do, discover
why, then and there, and RUN again.

How RUN/C Does It

RUN/C handles the difference between
the compiler and interpreter environments
with great common sense. As an interpreter,
it expects nothing but source, but #includes
can pull in #define and other source code
files — functions you have already written,
for example, or functions from commercial
libraries which provide source code, like
Greenleaf and BASIC/C. The #included
files say: bidden. They don't break your
links. And they don't SAVE with the main
you're working on. No inserting your system
with hazardous copies (no point mimicking
that "feature" of BASIC).

Or, external files may be MERGED into
your listing at any point — these will
display and SAVE with the host file.

The Features Keep Coming

The more you look, the more powerful
the product gets. It has valuable tracking
capabilities to show what's going on behind the
scenes as a program executes. Switch on
TRON, which displays on screen each line
of source code as it executes (intermingled
with what the program puts to the screen).
It shows just where you were in the
program when it departed for the back of
beyond. Or try TRACE, which shows the
current values of all variables referred to
in a source line each time it is
encountered. Or turn on PRON and then
let a program after a run, each line
appears with a number as in
<ID> printf("something"),

which says that the line was executed
twelve times, a vivid picture which to
optimize for efficiency.

There's more. RUN/C has just added
interrupts for PC DOS users, functions
which halt execution of your program to
directly call for services from the
operating system, and then return to your
program right where it left off.

Even Shell Capability

And more still. RUN/C has a SHELL
command which will invoke any operating
system command, with both RUN/C and
your program still in memory. No need to
exit and reload everything.

And finally the EDITOR command.
When RUN/C arrives, tell it the name of
your favorite editor's COM or EXE file.
Ask for it and RUN/C will load your editor
in parallel so you can switch back and
forth. (You'll probably need more than
256K.)

It's all here. A thoroughly satisfying
integration of best, source code examples, editor,
interpreter and utilities which will add both
speed and pleasure to programming.
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NOTES FOR THE PROS.

WE KNEW YOU'D ASK, SO...

RUN/C occupies 386K, and requires
256K. It can handle programs of up to 2000
lines. Its hundred-plus built-in functions
replace those found in most compiler
libraries. So when you compile RUN/C
programs, these function calls will find
library counterparts. As RUN/C favors no
compiler, some functions may not be
present in yours, or you may have
functions RUN/C does not.

Structures, unions, and enumerators are
supported, as well as keyboard and
screen redirection from and to files. There
are functions to access ports. No external
delimiters, and all functions must be
#included or #MERGED — an interpreter
expects everything on board. Typedef and
register not supported. RUN/C automati-
cally senses and uses 8087 math chip.

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world is headed, then we have the perfect
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send you BASTOC. It answers the question
of what to do with all these BASIC
programs. It translates BASIC into C. And
we'll send BASIC/C. It's a library of source
code subroutines which perform all those
handy chores that you are accustomed to
in BASIC: MID\$, INSTR, STRING\$, and
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60 String Functions: Manipulation of strings including center and justify, efficient left operations which add, delete, and sort pointers to strings for top speed.

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The Greenleaf Comm Library supports ASCII or binary, any parity, any word length, 8250 UARTs, all four Lattice C memory models: Hayes 300, 1200, 1200B and other modes.

Its 80-page manual has examples of each function, discusses asynchronous communications, and both the library and demo programs come with source (a mix of C and assembler).

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So with BASIC_C, when you're thinking INPUT, go ahead. Use, or LPINPUT or LOCATE or IMKEY. But without BASIC_C, you will find that every line of code plunges you back in the C weeds to figure out how to write it. Someday you'll want to cut out for now. BASIC_C is what you need to get quickly at the statements level so that you can concentrate on C's larger concepts.

There's a bonus: an unusually well-written manual with a first rate chapter comparing how BASIC and C go about their tasks. Without question, BASIC_C will ease your transition to C.

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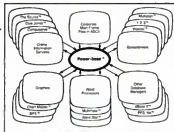
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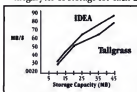
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Getting Busy Signals From Compaq, AT&T

IBM's entry into the phone-computer market is expected to come soon.

BY VIRGINIA DUDEK

NEW YORK—It is a technological union that seems as inevitable as the marriage of sound and film that produced talking pictures in the late twenties. Computer companies have been courting communications giants for months, and in several instances, the coupling has already taken place. In late March, the first fruits of these pairings were presented to the public in the form of hybrid machines that are both microcomputer and telephone.

Compaq Computer Corporation was, by a single day, the first company to proudly show off the new "telecomputers." AT&T countered by showing off its Communications Manager expansion card with a built-in modem, simultaneous voice and data transmissions, and one-button dialing. The card is designed for the AT&T 6300, and the IBM PC, XT, and most IBM compatibles.

AT&T also displayed the 510 Business Communications Terminal, targeted for the manage-



Compaq's new Telecompaq.



AT&T's Personal Terminal 510.

rial level. This unit combines voice and data capabilities, telephone management functions, and electronic mail. It has a built-in phone and uses a gel-based touch screen to control voice features, message retrieval, directory dialing, text messaging, database access, and to operate a calculator. STARLAN, the AT&T office networking system that integrates MS-DOS and UNIX System V workstations in a single network, and the long-awaited UNIX PC, an enhanced PC 6300, were also announced.

TC or Not TC

While the AT&T line is designed to allow easy plug-in of that company's sophisticated telephones, Compaq is attempting to break new ground with the TeleComp line of six

"telecomputers" that combine telecommunications and desktop computing. A new subdivision of Compaq, the Compaq Telecommunications Corporation (CTC), developed the machines.

The TCs, as Compaq refers to them, feature integrated voice/data communications, built-in communications supports, and personal productivity software that combines the various desk

(continued on next page)

IBM Cuts Prices, Unveils New XTs

BY CHARLES BERMANT

BOCA RATON, Fla.—As March went out like a lamb, industry observers were heating up the speculation mill. They were variously expecting IBM to unveil either a lap-top, a new home machine, or the long ru-

mored PC-2. But a Big Blue press release on April 2 yielded less spectacular announcements: new configurations of the PC-XT and price drops on the rest of the PC line except for the PC AT.

The cuts, from \$125 to \$500 (continued on page 38)

Compaq and AT&T (continued from preceding page)

organizer programs already available.

The user can move between tasks with display panel keys connected to the various functions. Six configurations offer a combination of fixed and flexible disk storage and interconnect capabilities to both digital and analog telephone switches.

Compaq officials acknowledge that only the arrangement of the devices is really new, yet they insist the TC is "a step beyond what is already offered." The company is striving for true integration, "a multifunction machine that you can use in the first 15 minutes."

Additional features include a built-in Hayes 300/1200 baud modem, a Z-80 8-bit telephony and datacom processor with 64K memory, two 360K disk drives, a third drive for personal productivity software, and a separate phone unit with integral speakerphone, handset, manual dialing pad, and control buttons. The six models are priced between \$4,195 and \$6,395.

"Compaq is going after a market opportunity," says Randall Sherman, vice president, telecommunications and office automation at Creative Strategies in San Jose, Calif. "Now that it's self-sufficient, it's attacking markets independently. It's a reality test for the company of what the market is doing."

Others see the reality setting in already. "I would like to have seen an existing interface for a PBX such as the SX 2000," says Amy Smith, a senior analyst at the Yankee Group, Boston. (The SX 2000 is a PBX made by Mitel, Inc.) Although Compaq has announced an agreement with Mitel to develop a proprietary interface for the SX 2000, that product is not yet available. Smith feels that such an interface would have given Compaq a head start.

Rooting for Rolm

Smith says that IBM and Rolm are prepared to address the market when the time is right, and that no real technical

innovations have been put forth by Compaq. "As far as IBM is concerned, it's set. IBM has the Rolm products and the installed base. I speculate that telephony functions are the next thing we'll see, maybe at the end of the next PC cycle."



AT&T's UNIX PC

"Compaq says it would like to lead in at least one or two areas," says Chris Christianson. "It's a pretty courageous move for a company that a lot of people expect to fail. But I think the move is well calculated. Compaq doesn't make rash decisions."

Norm DeWitt, director of the personal computer industry service at Dataquest in Cupertino, Calif., agrees that Compaq did well to enhance its product line and to expand distribution beyond the retail channel. "We can expect to see IBM enter the market in the very near future," he speculates, "though I do not think it will bowl anyone over because it has to interface with the Bell phone network. That's the strength of AT&T."

New UNIX PC

AT&T has strength in other areas as well. The company's announcement of the multitasking, multi-user UNIX PC also attracted considerable attention. Designed to simplify the user interface with the UNIX operating system, the base unit contains a hard disk drive, a floppy drive, a modem, the CPU board, and three expansion slots. The CPU provides the processor logic, bit-mapped graphics logic, and interface logic for all connected I/O devices.

"It's an interesting product," says Chris Christianson, senior analyst at the Yankee Group, in Boston. "It really brings UNIX down to the PC market. But does the PC market want UNIX? Most people find MS-DOS sufficiently baffling. AT&T must sell the product to software developers, retailers, and VARs first. Pushing it into end users' hands is a secondary consideration."

Legitimacy

"This could be the machine that legitimizes UNIX in the marketplace," says Frank Derfler, a purchaser of microcomputers for the Federal Government and contributing editor to *PC Magazine*. "But the number of good multi-user applications software packages can still be counted on the fingers and toes, as opposed to the number of database management sys-

tems on PC or MS DOS."

Enhancements to the AT&T 6300 include a communications manager for simultaneous voice and data transmission, the XENIX operating system, a high-speed coprocessor, and a 20-megabyte hard disk. But the 6300 may not carry AT&T into the multi-user market.

"It's just jacks for openers," says Derfler. "It's what AT&T needs to just enter the marketplace." Derfler feels that the 6300 is competing against an "as yet unannounced IBM product that I suspect is right around the corner," instead of against the IBM XT or AT. "The 6300 is not new and different enough to make much difference. AT&T will live and die on UNIX, not the 6300. UNIX can really make a mark for AT&T and legitimize the company in the consumer's eye."

Hotlines to Hybrids

ANALYSIS

BY BILL MACHRONE

The big story behind AT&T's new products announcements is, finally, communications. Everyone has been predicting AT&T's entry into low-end communications, but it's taken a full year for all the pieces to fall into place.

STARLAN is the glue that holds them all together. The low-cost network is designed to run on all of AT&T's machines, from the PC-compatible 6300 to the 3B series minicomputers. The new UNIX PC (or the 7300) speaks STARLAN too. So everything talks to everything.

STARLAN is especially important because it runs on twisted-pair wiring: ordinary telephone cable. This network's 1-megabit-per-second data rate is fast enough for all but the most demanding applications, certainly enough for office communications. Nobody knows better than AT&T just how many miles of copper wire are installed in the nation's buildings, and how many of them are

spares, unused by telephones. Use of spare lines and judicious addition of cabling will be very attractive to corporations seeking to network PCs.

When installation is included, cabling is the largest single networking expense. Coaxial cable not only costs more than twisted pair cable, but is more expensive to install. You need fewer and simpler integrated circuits to drive twisted pair networks, another cost savings.

LAN of the Giant

STARLAN uses Intel's 82586 network controller chip, the same one used by IBM's PC Network. AT&T's board uses simple line drivers to connect to twisted pair cables, while the PC Network adapter uses a complex RF modem. Future versions of the STARLAN adapter will use Intel's new 82588 chip (see "Intel Hits With New Chip," *PC News*, Volume 4, Issue 3).

This new chip permits even lower board cost, less hardware, and simpler software. The 588 chip is actually capable

(continued)

Hotlines (continued)

of driving twisted pair networks at up to 2 megabits per second, equaling PC Network in line speed.

Of course, network performance depends on much more than line speed. The network operating system and file server programs are even more critical. PC won't be able to test STARLAN until the fall, so the jury is still out on its true performance potential.

Computer/telephone hybrids are the latest fashion in deskwear. The UNIX PC has phone jacks and a built-in modem. The new TeleCompaq is a Deskpro and a telephone in a package that redefines "ungainly." AT&T even introduced a card for the 6300 that is both a modem and communications controller.

Of the three, the last is the most significant. The unique thing about the 6300's communications card is that it has an on-board microprocessor that permits the board to run in background. A broad range of electronic communications can then take place without interfering with the user's foreground task. In low-volume situations, it can even replace local area networking. More importantly, it presages a new generation of cards with on-board intelligence. It and others to follow will allow a PC to do far more than it can now, simply by dividing tasks among dedicated microprocessors.

TC No Magnum

Compaq's shotgun wedding of a Deskpro and a desk phone is self-described as unique and trendsetting. Yet it falls short on several key points. Like Zaisan's ES.3 (see "Zaisan's Message: PC, Phone-in-One for \$2,995," PC News, Volume 3 Issue 20), it uses a second microprocessor to run the phone. Unaccountably, it is not blessed with enough intelligence to do communications tasks in background.

To retrieve electronic mail, you must suspend normal foreground activities, then use the mail service "manually." While switching is rapid, re-

quiring just a keystroke, it shouldn't be necessary at all. One ray of hope: The software that controls the phone is downloadable from the MS-DOS main computer. A Z-80 8-bit processor actually runs the phone, and maybe someone with a little more imagination will program this popular chip to run communications in background.

The TeleCompaq is also way too expensive for most businesses. Companies will flock to these hybrids when they start looking more like a phone with a free computer rather than a

computer with a free phone. In the case of the Compaq, you're paying a premium for both.

AT&T and Compaq are coming from radically different places to get onto the manager's desk. For once, AT&T is coming to the market with an innovative product, full of fresh thinking. The TeleCompaq had to stay within reasonably well-defined boundaries so as not to scare the telephone companies that will likely form its distribution channels. Its compatibility with a wide variety of digital and analog PBXs is, at this stage of the game, more attractive to

the phone companies than to end users. It proves that Compaq speaks their language.

There was never any doubt about AT&T's fluency in telephone. That's why Ma Bell had the freedom to be innovative with the 7300 and its companion personal workstation. A network of 7300s or 3B2s supporting individual phone-equipped workstations will not only cost less than an equivalent network of telePCs, but will outperform the networked PCs when doing what most businesses mean by networking: sharing centralized data. ■

Ericsson Turns New Leaf With 15-Pound Portable

BY CHARLES BERMANT

GREENWICH, Conn.—Ericsson Information Systems, a Swedish company that markets a line of ergonomically designed microcomputers, has introduced a powerful 15-pound PC-compatible portable com-

port. For an extra \$600, the memory can be increased to a total of 512K.

Also available as options are a 300/1200 baud Hayes-compatible modem, costing \$300, and a thermal-transfer printer that lists for \$395. Both are internal devices.



The plasma screen Ericsson Portable PC.

puter that is, the company says, "the first desktop portable with a high-resolution plasma screen."

The machine's base price is \$2,995, which includes 256K of memory, one 5 1/4-inch disk drive, and a serial and parallel

Plasma Premiere

The Ericsson Portable PC follows an industry trend toward full PC performance in a much smaller package. Its flat-screen, gas-plasma technology gives it an apparent advantage over similarly configured machines with

liquid crystal displays, which are generally considered more difficult to read. However, since the company says its new portable won't be widely available until fall, other companies, including IBM, could nullify Ericsson's early edge in the market.

Margaret Halpin, Ericsson's market communications coordinator, says, however, that IBM's actions are of little concern, adding, "We feel our machine is better designed for the work environment and office needs. The machine is really worth it."

The machine uses the Intel

The Ericsson Portable PC follows an industry trend toward full PC performance in a much smaller package.

8088 processor and operates on either 110- or 220-volt current. It has no provision for battery-powered operations. Ericsson company officials describe it as a desktop, rather than laptop, computer.

There are currently no expansion slots on the machine, but Ericsson hopes to soon make available a bus-connected expansion chassis that has the room needed to accept two expansion boards. ■

STAR'S NEW
SPREADSHEET
PRINTERS:
4 WAYS TO A
BETTER
BALANCE SHEET.



SR-15™ features a 16K buffer and prints at 200cps

Let Your Fingers Use Your Modem . . .

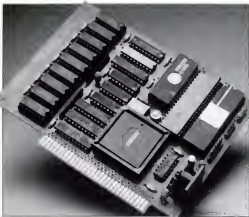
Now your fingers have to walk only as far as your keyboard, and your computer will take you the rest of the way. **American Business List Inc.** has an on-line database of listings from every Yellow Page directory in the U.S. The **Instant Yellow Page Service** has over 300 different Yellow Page titles of businesses and services, organized by category and location.

Once you've accessed the Instant Yellow Page Service, you enter a 4-digit title code and select the zip code of any area you wish. The service charges a \$15/month subscription fee, \$1/minute for connect time, and .10 per printed record or for each screen downloaded to a floppy disk.

For more information about the service and special discount rates contact American Business Lists Inc., P.O. Box 27347, Omaha, NE 68127, (402) 331-7169.

Truly Micro . . .

A plug-in, single board computer has been introduced by **Faraday Electronics** of Sunnyvale, California. Called the **Faraday Micro PC**, it is compatible with the IBM PC



The 8088 drives Faraday Micro PC.

and, according to the company, well-suited for compact and portable computers.

The Micro PC was designed around Faraday's FE 2010 CMOS integrated circuit. It features an 8088 CPU with optional 8087 co-processor, 256K of parity-checked RAM, 32K of user-EPROM space, 4 DMA channels, 3 timer channels, one IBM-compatible keyboard port, one speaker port, and one reset port. The Faraday Micro PC costs \$695, and supports UNIX and PC DOS, Concurrent PC DOS and VRTX.

Faraday Electronics, a major supplier of IBM PC bus-compatible single-board products for OEM manufacturers, is located at 743 Pastoria Ave., Sunnyvale, CA 94086, (408) 749-1900.

Exterminating AT Bugs . . .

Atron has introduced the **AT PROBE**, a hardware-assisted debugger that resides on a PC AT. The AT PROBE can tackle difficult program bugs by intercepting signals to and from the processor and trapping and tracing all that happens in the system.

Because the AT is so powerful and its application programs so large and complicated, the AT PROBE also had to be very powerful, according to Perry Lynne, vice president of marketing for Atron.



Atron's AT PROBE scans hardware and software for debugging chores.

The AT PROBE has a 1-megabyte on-line symbol table, a real-time tracer, and the ability to set up breakpoints on reading or writing memory, I/O, instruction execution, or interrupt. It supports standard assemblers as well as high-level languages.

The AT PROBE comes with performance and timing analysis software that allows you to create histograms that show where the execution of different procedures takes place. The AT PROBE has a retail price of \$2,495.

Atron corporate headquarters are at 20665 Fourth St., Saratoga, CA 95070, (408) 741-5900.

Latest in the Series . . .

There's a new model in the IBM System 9000 family of scientific and industrial computers—microsystems built around the 68000 processor that are incompatible with IBM's PCs, but similar to them in scale (see "PC's Powerful Cousin: The IBM CS9000" in PC, Volume 3 Number 5). The **IBM 9003** is designed to operate in an industrial environment, controlling machine tools and robot devices.

The computer's 66-inch-high sealed cabinet and closed-loop air conditioner allow it to function at temperatures of up to 125 degrees Fahrenheit and to resist water, dust, and oil-mist contaminants.

This system, which can run under XENIX, is priced at \$21,130. The 9003 will be available in the second quarter of 1985 from IBM Instruments, Inc. For more information, contact IBM Corp., Information Systems Group, 900 King St., Rye Brook, NY 10573.

Setting the Standards . . .

Many people feel that computing would be much easier if more standards were established and set. Apparently, the members of the **Network Users Association (NUA)** agree, and they have voted to endorse the use of networking and interconnection standards. This endorsement applies to physical interface and packet-switching standards as well as open systems interconnection standards.

NUA president Mike Harrop says he hopes that the organization's support will help the overall standards-development effort.

All NUA members will have access to the **NUA Handbook**, which will contain a list of sources for the standards. The handbook, and more information on the NUA, is available from **Network Users Association**, 2111 Eisenhower Ave., #400, Alexandria, VA 22314, (703) 683-8500.

Business-Pro's AT Performance

AUSTIN, Texas—Texas Instruments has entered the AT-workalike competition with its "hybrid" Business-Pro, which the Austin-based company claims is both IBM AT- and TI-Pro compatible.

Scheduled to reach dealer shelves in June of this year, the

and text equivalent to that of the IBM Color/Graphics adapter. For maximum flexibility, both controllers, priced at \$495 apiece, can be installed in the machine.

The Business-Pro is compatible with NetWare/E-TI software and allows a local area network of up to 50 PCs and 3 printers to share its beefy 144 megabytes of disk storage. The network uses EtherLink LAN hardware.

The basic configuration with system unit, keyboard, serial/parallel interface, 512K RAM, and 1.2-megabyte floppy drive costs \$3,995. The enhanced base model adds a speedy 21-megabyte Winchester drive (its 30-millisecond average disk

access time is 1/3 faster than the AT's disk access speed) and is priced at \$5,795. Eight other configurations for the Texas Instrument AT-workalike are available, ranging in price from \$4,440 to \$10,785.

—By Virginia Dudek

Texas International's Business-Pro.

TI Business-Pro is based on the increasingly popular 80286 microprocessor, running at 6 mHz. While 512K of RAM is standard, users can install up to 3.6 megabytes on the motherboard itself, without having to waste any of the machine's 14 (8 full-size and 6 half-size) expansion slots. Serial and parallel ports are also built into the main board, eliminating the need for basic add-on I/O boards. The chassis can hold as many as six half-height drives, in a variety of configurations; fully loaded, the Business-Pro boasts a pair of 72-megabyte hard disks, a 1.2-megabyte floppy similar to that in the PC AT, and a 60-megabyte tape backup.

While the Business-Pro can reportedly drive a 720-x-300 pixel TI color monitor, users can add a separate IBM-compatible video card for graphics

IBM Cuts Prices [continued from page 23]

per machine, were less than many analysts had expected. If the action was a signal, opinion was divided as to what it meant.

The new PC-XT versions, designed to give customers greater flexibility in meeting their personal computer needs, each boast 256K memory and are outfitted with either one or two 360K floppy disk drives. Fixed disks are not standard equipment. The machines feature the XT planar board, which includes the 16-bit Intel 8088 microprocessor and the XT power supply.

The new XT's are priced at \$2,270 for one floppy disk drive and \$2,570 for two. The only differences between the new XT's without fixed disks and the older standard PC are the power supply and the number of expansion slots—the new models have 8 to the PC's 5.

These specifications prompted speculation that the new XT could eventually take the place of the PC. The move came 2 weeks after the discontinuation of the PCjr. Reaction was mixed as to whether IBM would seal down the PC's price to the PCjr's level or phase it out entirely and replace it with a cost-reduced compatible.

Kindest Cut

When asked if the cuts were a prelude to the discontinuation of the PC, company spokesperson John Q. Pope said "Customers are going to buy what they want. The PC has not been withdrawn."

Industry forecasters had mixed reactions. "We thought that the price cuts would be more substantial," says Jim Weil of The Yankee Group in Boston. "IBM looked at the elasticity of demand and saw it could generate as much sales with a smaller cut as a large one. But I expect another round of cuts before the introduction of the PC-2. The way prices are now there would be too much overlap."

Weil says that some compatible makers must now be "heaving a sigh of relief" as to the state of the cuts.

"The PC has been selling for three and a half years," says John Hemphill, senior analyst for Future Computing in Dallas. "It's well into a product cycle, and it has some unneeded features, like a cassette port. It makes sense for it to go away. The rearrangement makes a lot of sense."

Hemphill said that IBM could be setting the stage for the discontinuation of the PC in the next 6 months.

Other new prices are: PC-XT, 256K, one disk drive, 10-MB fixed disk, \$3,895 (128K, \$3,775); PC, 256K, two disk drives, \$2,115; PC, 64K, two disk drives, \$2,195; PC Portable, 256K, two disk drives, \$2,895.

The price of the bare-bones PC which comes with 64K and no disk drives, was increased from \$1,265 to \$1,390. No reason for the price hike was offered for that action.

IBM Fixes Disk Problems

Shortages are no longer expected.

BOCA RATON, Fla.—IBM, which once relied exclusively on fixed disks manufactured by Computer Memories, Inc. (CMI) of Chatsworth, Calif. for its PC AT, will now market the machine with hard disks from two additional sources.

Besides CMI, IBM itself and a third, unnamed source will

manufacture AT hard disks. IBM's own disks, manufactured in Rochester, Minn., are already in production but have not been shipped. IBM has made no projections as to when the supply of AT's will meet demand, but the company expects to double shipments during the next quarter, according to a PC spokesperson. IBM currently installs some of its own fixed disks in the PC-XT.

Hal Prewitt, president of

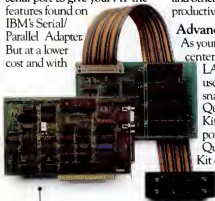
CORE International, a hard disk manufacturer based in Delray Beach, Fla., says IBM was more careful about selecting the third AT disk manufacturer because of earlier problems with the CMI drives first used in the AT. Prewitt says that IBM was being "a lot more cautious," and ordering disks from several companies for product testing. He says that his company did not participate in the process because of IBM's stated desire to produce a high volume of drives at a low cost.

—By Charles Berman

EXPANDABILITY TO THE SMART WAY.

QUADPORT-AT™

Quadport-AT combines a parallel printer port and a serial port to give your AT the features found on IBM's Serial/Parallel Adapter. But at a lower cost and with



built-in expandability. Connect printers, plotters, modems, and other devices for increased productivity.

Advanced Port Expansion

As your AT becomes the center of a high-performance LAN or growing multi-user, multi-tasking system, snap on the optional Quadport-AT Expansion Kit and add 4 more serial ports to your system. The Quadport-AT Expansion Kit comes with software to access these ports, making it easy to add shared peripherals or workstations.

Enhance the smart way with Quadram.

For basic AT expansion, Quadmeg-AT and Quadport-AT work together to provide 128K memory expansion, a serial port, and a parallel port.

Then, as your system grows, Quadmeg-AT and Quadport-AT give you up to 4MB RAM, 1 parallel port, and up to 5 serial ports in just two PC AT expansion slots. Only Quadram combines so much power and expandability. That's PC AT enhancement the smart way.

Features

Quadmeg-AT: RAM expansion from 128K to 2Mbytes. Expandable in 512K increments. Split memory mapping assigns 128K or 384K to base memory.

Total RAM Capacity: 4Mbytes.

Quadport-AT: Port expansion with 1 Centronics parallel port and 1 RS-232C serial port.

Expansion Cards: Two cards available. Each comes with 512K or 1Mbyte RAM installed.

QuadMaster-AT Software: RAM Drives and Spooling for extended memory.

Quadport-AT Expansion Kit (optional) 4 RS-232C serial ports. Software to access ports.

For a free demonstration visit the Quadram dealer nearest you. Or, for information, write us at 4355 International Blvd., Norcross, Georgia 30093 (404) 923-6666.



CIRCLE 496 ON READER SERVICE CARD

Join the network

Develop a program for the new IBM
PC Network.

Promote yourself into the top ranks of network programmers. Write new programs or modify existing ones to run on the local area network that's sure to be a best seller.

Capitalize on a chance to be in from the beginning with integrated business applications, productivity tools and office automation programs.

A high-level interface card makes programming for the IBM PC Network fast and easy. Full data sharing and byte locking capability, multiple servers, two megabits per second data transmission and a complete diagnostic package make the network equally as attractive to the end user.

For complete details about joining the network call 1-305-241-3102. Or write IBM Corporation, Editor, IBM Personal Computer Seminar Proceedings, 4629, P.O. Box 1328 Boca Raton, FL 33432.



The Big Blue Shuffle . . . IBM has transferred the man generally credited with overseeing the development, launch, and rapid growth in popularity of its PC family of microcomputers. **Philip D. (Don) Estridge**, formerly president of the Entry Systems Division in Boca Raton, Fla., has been named vice president, manufacturing. Promoted to replace him as head of the division that develops and manufactures PCs is **William C. Lowe**.

Lowe moves up from assistant group executive for IBM's Information Systems and Communications Group. He joined IBM in 1962 as a product test engineer in Raleigh, N.C. He was systems



Philip D. Estridge



William C. Lowe

manager and later lab director at Boca Raton in the late 1970's when the PC was in development.

Estridge, a 25-year veteran of the company, began working with the PC in 1980 when he was appointed manager of what was then called the Entry Level Systems-Small Systems group. His new duties include responsibility for IBM's worldwide manufacturing facilities.

John A. Pope, information programs manager in Boca Raton, said the changes in management would have no noticeable impact at either the retail or consumer levels. He also said such shifts of managerial responsibilities were common at IBM.

Keeping Up With USA Today . . . Gannett News Media Services has launched an on-line USA TODAY Update on NewsNet, CompuServe, and General Electric Information Services.

The highlight of USA TODAY Update is a service called Decisionline that offers news and industry trend information in the banking, insurance, law, technology, energy, and travel fields.

USA TODAY Update operates from 8 a.m. to 11 p.m. and Decisionline is available starting at 9 a.m. each business day. Each hour, a Hotline is available that contains important national, international, business, and financial news, as well as weather information. Special Reports, written in a question and answer format, are issued on an average of 3 to 6 times a day in response to major news developments.

More information about the USA TODAY Update service can be obtained from the Gannett Co., P.O. Box 450, Washington, D.C. 20044, (703) 284-3400.

IBM Slides . . . IBM has signed a nonexclusive agreement with **Advanced Graphics Software, Inc.** of Sunnyvale, Calif. to market and distribute Advanced Graphics' *Slidewrite*.

Slidewrite, a business-presentation graphics program, allows users to create professional-quality text slides on both paper and overhead transparencies. It runs on the PC, XT, XT/370, Portable PC, PC-AT, and the 286/386.

Litigious Computing . . . General William

Westmoreland may have dropped his libel suit against CBS, but it was not for lack of access to available information. The general's lawyers prepared his defense by using a PC in ways that might set trends in the legal profession.

The **Rust Consulting Group**, litigation support consultants, helped the Capital Legal Foundation build a database of important legal information using *INMAGIC*, a text indexing/information retrieval software package. The database, created on a DEC/VAX 11/780 and then moved to an IBM PC with a Tallgrass 45-megabyte hard disk, contained almost 10,000 documents of evidence and 150 depositions.

The lawyers representing Westmoreland used the PC and database for trial support.

Habla DOS Lenguajes . . . Linguistic Products, a Texas-based software firm, has developed the first language-translation program for the PC. The initial version, which converts Spanish text files into English, is priced at \$490 and features a Spanish dictionary of 11,000 words.

The program can translate an entire file, or be used in dictionary mode, providing instant translations for specific words. It doesn't provide a perfect translation—some editing for grammar and nuance is necessary when the process is finished. According to the company, however, the program reduces human effort in the translation process by 75 percent.

Program co-author George Mallard says that contractors are now using the program to determine whether or not to bid on a project along the border, without having to pay a translator a steep hourly rate.

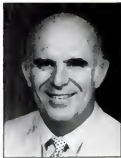
Linguistic Products expects to market other language versions of the package soon, including an English-to-Spanish translator.

For more information, contact Linguistic Products, P.O. Box 8263, The Woodlands, TX 77387, (713) 363-9154.

Kodak Focuses On Disks . . . Eastman Kodak, which entered the floppy disk market only last October, now wants to make certain that it will be a leader in the field. Kodak wants to buy **Verbatim**, the Sunnyvale, Calif.-based leader in the diskette manufacturing market. Kodak executives say the company's tender offer of \$7.55 a share for Verbatim's 23.2 million shares must draw 90 percent or more of Verbatim's fully diluted shares if Kodak is to buy all tendered shares. If Kodak's offer draws less than 90 percent of the shares, Kodak will purchase only 49 percent of the stock. Kodak is not committed to buying any of the shares if the bid draws less than 40 percent.

J. Phillip Samper, executive vice president and general manager of Kodak's photographic and information management division, says that because of "Verbatim's reputation for product quality . . . manufacturing excellence, and technical know-how," the acquisition of the company will "substantially enhance" Kodak's presence in the market.

Kodak says it doesn't like to discuss its position in the market, but suspects that the acquisition of Verbatim will allow it to maintain an 18 percent share—just slightly higher than the percentage Idixex recently claimed after its merger with Dysan.



J. Phillip Samper

BUYERS GUIDE TO DESKTOP ORGANIZERS

A COMPARISON OF THE MOST POPULAR PRODUCTS

	PolyWindows Desk	Sidekick	Spotlight
ROLODEX-TYPE FILES			
Variable Card Size	YES	NO Files	NO
Multiple Card Decks	YES (1-10)	NO Files	YES
Number Cards Per Deck	RAM Limit	NO Files	500 Max.
Max. Characters Per Card	999	NO Files	480
Search	YES	NO Files	YES
Auto Alphabetize	YES	NO Files	YES
Print Card	YES	NO Files	YES
Print Deck	YES	NO Files	YES
CALENDAR			
Daily Notes	YES	NO	NO
Mark Important Days	YES	NO	NO
Date Range	1752-2099	1901-2099	1901-2099
APPOINTMENT BOOKS			
Multiple Appt. Books	YES (1-10)	NO	NO
"Things To Do" List	YES	NO	NO
Print Appointment Book	YES	YES	YES
ALARM CLOCK			
Display Time	YES	NO Alarms	YES
Hourly Chimes	YES/Optional	NO Alarms	NO / PM
Time Format	AM / PM	NO Alarms	AM / PM
Display Alarm Message	YES	NO Alarms	NO
Number of Alarms	9	NO Alarms	Many
CALCULATOR			
On-Screen Tape	YES/Optional	NO	NO
Printing Tape	YES/Optional	NO	NO
Percentage Function	YES	NO	YES
Display With Commas	YES/Optional	NO	NO
Floating/Fixed Decimals	YES/Both	Fixed	Floating
Memory	YES	YES	YES
Insert Result in Work	YES	YES	YES
Max. Display Digits	15	18	12
Display Number > Above	YES/Exponential	NO	NO
Scientific Notation	YES	NO	NO
Binary/Hexadecimal	NO	YES	NO
NOTEPAO			
Multiple Documents	YES (1-10)	NO	NO
Word Wrap	YES	NO	YES
Merge Files	YES	NO	NO
Change Margins	YES	NO	NO
Variable File Size	YES	YES	NO
File Size Limit	64K	50K	4.4K
Variable Window Size	YES	YES	NO
Print Document	YES	YES	YES
Print Window Only	YES	YES	YES
Undo/Redo Key(s)	YES	YES	NO
Cut & Paste Screen Text	NO (Note 1)	Import Only	NO
KEYBOARD ENHANCER			
Number Keys Redefined	YES Up to 60	NO/Not Avail.	NO/Not Avail.
Total Keystrokes	YES 2500	NO/Not Avail.	NO/Not Avail.
GENERAL CHARACTERISTICS			
100% Memory Resident	YES	NO	NO
Minimum Memory Used	47,500	61,300	77,200
Typical Memory Used	50-75K	61,000	77,200
On-Line Help	YES	YES	YES
Moveable Windows	YES	YES	NO
Redefine Colors	YES	YES	YES
Expandable/Add Functions	YES	NO	NO
Can Remove Functions	YES	NO	NO
Integrated Interface	Excellent	Good	Good
Visual Appeal	Excellent	Fair	Poor
Speed	Very Fast	Fast	Slow
ADD-ON FUNCTIONS			
Auto Dialer	NO (Note 2)	YES	YES
DOS Functions	NO (Note 1)	NO	YES
Game	YES	NO	NO
ASCII Chart	NO	YES	NO
COST - PROTECTED	\$49.95	\$54.95	\$149.95
COST - UNPROTECTED	\$84.95	\$84.95	NO/Not Avail.

Note 1: "PolyWindows DOS" add-on available soon at extra cost to add cut & paste and many additional functions.

Note 2: "PolyWindows Phone" add-on available soon at extra cost to add auto-dial, phone log, cost computation, etc.

Say Yes!
to PolyWindows
Desk
and
No!
to Sidekick
and Spotlight.

Thousands of PC users are choosing PolyWindows Desk over Sidekick and Spotlight every week. It's easy to see why.

Other Desktop Organizers either totally ignore some of your basic Desktop needs, or are inflexible and cumbersome.

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Opening the Envelope On Electronic Mail Service

Telecommunications may not be as private as you wish.

BY ERIC FREEDMAN

"People are concerned if they see their mail opened when it comes to their home. They don't think of it when they use electronic mail, and they wouldn't even know because there's no Scotch tape on the envelope," says Norma Rollins, acting director of the New York Civil Liberties Union.

Electronic mail is now a \$100-million-plus-a-year industry, and its expanding popularity as a medium of business and personal communication is sparking worries over the privacy and confidentiality rights of its users.

Industry systems operators, civil libertarians, attorneys, and government officials share those concerns with electronic mail service users. However, few laws guarantee the privacy of electronic mail communications from curious or malicious computer users, from industrial espionage, or from government itself. "Everything is in a gray area," says executive director Michael F. Cavanagh of the Electronic Mail Association (EMA). Government agencies are obliged to follow strict procedures before opening a traditional letter or eavesdropping on a telephone call. But, as Rollins points out, no laws now on the books prevent government interception of electronic mail "because of the mode in which it's transmitted."

Steve Metalitz, staff director of the U.S. Senate Judiciary Subcommittee on Patents, Copyrights, and Trademarks, which has jurisdiction over privacy legislation, is "concerned about the privacy of data communications. If they've never been in voice form, they're not

protected by the wiretap law."

So far, law enforcement agencies have not made many demands on system operators to disclose the contents of customers' files and messages. But given the proliferation of PCs and the growing use of both in-house and commercial electronic mail services by business and personal users, such demands for access are bound to increase.

Seeking Access

The best known government attempt to gain access to a subscriber's private information from a commercial electronic mail operator occurred in Detroit. A federal grand jury there subpoenaed the Source Telecommunications Co. for information about an alleged international cocaine trafficker who used The Source. The grand jury sought "printouts of any and all records, data, documents, or electronic mail" about the suspect, his associates, and their business operations.

The U.S. Attorney in Detroit contended that the material was not legally protected from disclosure in the same way that a letter or telephone call are. The Source provided billing information, but contested the demand for substantive material. There was no court ruling on whether The Source was required to make a complete disclosure; the dispute became moot when the grand jury issued indictments.

Self-Regulation

In the absence of federally-mandated procedures regulating protection or disclosure of electronic mail files, the industry has relied on voluntary privacy measures. For example, the Videotex Industry Association (VIA) drafted "model privacy guidelines" and urges its members to adopt them to "help inspire consumer confidence in this new technology."

Regarding court orders to release information about their subscribers, VIA executive director Robert Smith, Jr. says, "Most system operators have adopted our guidelines, or something pretty close to them."

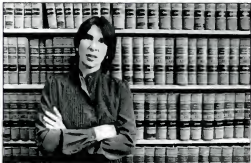
Companies that provide commercial electronic mail services insist that they are committed to confidentiality, whether the demand for disclosure comes from individuals or businesses. "It's as private as anything that goes through the U.S. mails. We do not read it. We do not let any-

have to come from Congress.

EMA's Cavanagh believes Congress should act against all three types of those he considers to be abusers: curious users, corporate spies, and official agencies. "There has to be legislation that puts together a unified response so system operators and subscribers can know what the law is," he explains.

But Rollins says, "It's not a question you can answer with one set of rules: Control of government access should be the priority for action. It's clear they shouldn't just decide to intercept electronic mail on a fishing expedition. There ought to be some strict legal standard."

Civil liberties groups favor requiring official investigators to follow procedures similar to those governing access to telephone communications. Such



Norma Rollins, acting director, New York Civil Liberties Union.

body read it. The customers' files are confidential," says CompuServe's Paul Battaglia.

There is some apprehension that voluntary efforts will not adequately safeguard personal privacy. As Rollins, who heads the NYCLU Privacy Project, put it, "Industries follow voluntary guidelines to ward off government action. They work only as long as it's economically worthwhile to follow them."

Capital Hill

Some states are modernizing their criminal laws to address the aforementioned problems of computer crime and unauthorized private access to electronic databases. However, a comprehensive legislative answer to privacy in electronic mail will

procedures would force officials to prove they have reasonable cause to believe the content of the database is relevant to the investigation and to show that the government can't acquire the information through "less intrusive" means.

On Capitol Hill, Senators Charles McC. Mathias (R-MD) and Patrick J. Leahy, (D-VT) say they hope to draft electronic mail privacy legislation.

That's no easy task. Noting that new laws regarding confidentiality of computer databases could have implications for other aspects of the rapidly changing world of telecommunications, Metalitz reiterates, "It's a difficult area to legislate."

Memory Scheme (continued from page 33)

board manufacturer, aided and abetted by a large supporting cast of software companies from every walk of life. (IBM is notably absent.) The consortium is offering a new approach to virtual memory management, an arrangement that permits programs running on the PC to range far beyond normal memory limits. Together, the companies have created a memory management standard that is expected to use some form of bank-switching, which involves substituting one entire bank of memory for another.

True Tales

Lotus has been the driving force for the hardware companies, while Intel has been talking to the software companies. Software publishers have been talking to Intel's newest division, a group in Hillsboro, Ore., which has given them all a look at the coming standard.

One of the more puzzling aspects of this venture is the high level of secrecy surrounding its planning and execution. Initial inquiries were met with stony silence, flat denials, or "No comment." Sources said that the companies feared consumer backlash in the form of the "Osborne Effect," wherein early announcement of a new product kills demand for the existing product. To date, Lotus has still not acknowledged its role in the project. Alternate sources indicate a full-scale product rollout at the Spring COMDEX in Atlanta. Lotus will likely have the first software product, while all the major board manufacturers will have memory management cards available. Microsoft may be forced to release an interim memory management version of DOS, even though its intent was to keep version 3.1 stable until DOS 4.0 was ready.

The Microsoft Connection

Previous bank-switching schemes performed their ledger-dance without the operating system's awareness. All concerned quickly recognized that DOS would have to know about the bank-switching process to effectively manage the multiple

activities afoot in next-generation PCs. Hence Microsoft's involvement.

When questioned about the scheme, Microsoft chairman Bill Gates exclaimed, "It's garbage! It's a kludge! . . . But we're going to do it." His reservations concerning the Lotus/Intel approach are based on its apparent inelegance and lack of consonance with Microsoft's long-range plans for DOS. Version 4.0 is widely believed to be the one that will unlock the full power of the 80286, decisively breaking the 640K barrier. There is also speculation that DOS 4.0 will offer memory management in conjunction with an as-yet-unreleased generation of memory cards for older PCs.

Junior Axed By IBM (continued from page 33)

pled with an exceptionally aggressive advertising campaign, made the PCjr a hot item for the 1984 Christmas season. Most industry estimates suggested that more Juniors were sold than any other computer, including the PC, XT, and the heavily-promoted Apple IIc.

By January, industry observers were estimating that at least 250,000 PCjrs had been sold. However, once the prices rose and the gift-giving season ended, retailers reported that the Junior reclaimed its reputation as a slow mover.

Finally, on March 19, IBM announced that the last PCjr would roll off the line in April.

Mixed Bags

Industry reaction to the IBM announcement ranged from surprise to denial, and if anything, pointed to the Junior's outstanding market positioning problems.

Multimate International of Hartford, Conn., was intending to unveil a PCjr-specific word processor at Spring COMDEX but quickly turned it into a low-end PC version of its word processor, *MultiMate*.

"We expected more of a slowdown," says company president Wilton Jones. "But we're not going to lose that mar-

Consumer View

There is little doubt that the new memory management standard will speed up some applications and allow others to be far larger than any conceivable on today's machines—but at what cost?

Memory board manufacturers are universally optimistic about the 256K chip's immediate future. Priced as low as \$6 each in quantity, it is not significantly more expensive than the 64K chip was 2 years ago. The unknown factor is how long the 80286 will remain at its over-\$100 price.

Several other industry leaders have echoed Gates's concern that the memory management scheme is only a stopgap measure on the way to full use of the 80286's on-chip memory management. *PC Magazine* shares that concern. ■

ket, which will shift over to lower-end PC use."

"I'm surprised IBM has elected to discontinue it," says Norm DeWitt of Dataquest in San Jose. "But I expected some marketing action to be taken.



With the cost of building the Junior, IBM was not making any money. IBM is just making a business decision; I don't expect it to give up the home and education markets."

"It certainly has an effect on us," says Ron Harrison of Impulse Computer Products in Salt Lake City, which manufactures a line of PCjr peripherals. "Right now all we have are PCjr products, there are quite a few companies out there making nothing but PCjr equipment. But there are a lot of PCjrs out there, people aren't going to throw them away."

Greg Brehm, vice-president of Legacy Technologies in Lin-

coln, Neb., was understandably dismayed by the announcement. His company produces hardware add-ons exclusively for the PCjr. "The long-term outlook is not good, of course," he says, "but there are a number of machines out there, and their owners are going to want to upgrade."

"It becomes a cult market," Brehm says, predicting that Legacy would be able to stay healthy in the Junior market long enough to diversify its product line.

One industry observer says the history of the PCjr shows that IBM has made a lot of mistakes, of which the most important was generating hype the product could not match. Its marketing strategy made too many zig-zags. "It was an awful lot of changes for a company that is supposed to be in control."

"The competition was too stiff," says Ed Hatfield, president of Financial Software, Westboro, Mass. "The PCjr was not up to it. But we will continue to manufacture and support our PCjr product and serve the market that's already in place."

John Williams, director of marketing for Sierra On-Line in Coarsegold, Calif., maker of a line of entertainment software for the Junior, expressed disbelief that IBM was getting out of the low-end computer market completely. Williams says, "We don't believe they're going to cancel that [the PCjr] for all time. Last year I think IBM got a taste of what it's like to have a machine that's cheaper than Apple's, and I think they liked it."

IBM's Pope says that IBM will continue to produce cartridge software for the PCjr but would not say if the company would announce any additional programs. IBM will also continue to provide spare parts and options such as the extra-memory boards.

In addition, Pope says, IBM will continue to market, service, and fully support those machines currently for sale and in use. The company's toll-free help number will also keep operating. ■



The Price is Right—Look it Up

It looks like you've found a great deal on a used PC and modem—the ad said the hardware was owned by a little old lady who only sent electronic mail to her children on Sundays. But how do you know if the price is right?

If you were buying a car, you could sneak a peek at a salesman's "blue book"—a price guide to used cars of every make and vintage, compiled by the National Auto Dealers Association.

Now there's a similar authority for used personal computers, peripherals, and software. The 3,000-member National Computer Dealers Association (NCDA), based in Houston, Texas, publishes the *Official New and Used Computer Price Guide*, a blue-covered, hip-pocket book that puts a price on thousands of previously owned computer products.

NCDA editorial director Ray Davis said that all the prices in the guide are actual prices at

which each used item has been sold—advertised asking prices weren't taken at face value. The NCDA gathers this sales-price data from 10 used computer dealers and by responding to classified ads a month later to ask what amount sellers actually received.

Davis said the NCDA's guide is also used by major insurance companies and banks to determine the value of a client's computer assets when evaluating damage claims or loans.

The retail edition of the *Official New and Used Computer Price Guide*, which lists prices for over 3,000 used products, is available in bookstores and on single copy orders from NCDA for \$12.95. A wholesale edition, with over 6,000 listings in each quarterly issue, is available by subscription. Send \$34 for four quarterly issues to the National Computer Dealers Association, 13231 Champion Forest Dr., Houston, TX 77069, (713) 586-0209. ■

Look for the Union Label

So you think you're a patriot because you resisted the temptation to buy a cheap, Asian-made PC clone. Instead, you laid your money down for a red, white, and big blue all-IBM system. While that might have been a wise purchase, don't credit yourself too much for buying American. An exploded view of a PC, published in *Business Week* (March 11, 1985), reveals that nearly three-quarters of the PC's manufacturing costs are for foreign-made parts.

A typical PC system, including the IBM monitor and printer, costs \$860 to manufacture, according to figures supplied by Future Computing and Businessland. Of this, \$165 is sent to Singapore for a pair of disk drives, \$85 to Korea for the monitor, and \$375 to Japan for the printer, keyboard, power supply, and half the chips. At the domestic end, IBM spends only \$230 for the remaining chips, the case, and labor to assemble the computer.

It's probably still important to Buy American—but it's getting tougher to know when you can. ■

Bosses Beware of a Snake in the DOS

All work and no play is the usual lot of PC users with monochrome systems, because almost no arcade-style games have been designed to run on their green screens.

It's fortunate, then, that *Snake*, one of the only monochrome action games, is not only a good piece of entertainment, but has a key command that suits it to an office environment. If you're in the middle of a round of *Snake* when your boss approaches, you can press the B key to instantly blank out the screen. Just remember that B stands for Boss.

When the coast is clear, you

can resume the game by pressing any other key. But if your boss stops and asks you to do a job on the spot as he looks over your shoulder, the game lets you cover your tracks by pressing the B key a second time. That causes the PC's screen to return to the DOS prompt, leaving no trace of your *Snake* break.

Snake's job-saving B command is easy to learn. The manual prompts you to remember this rule: "Two Times 'Boss' equals DOS."

This Baen Software game, priced at \$29.95, will run on color systems as well as monochrome. It's distributed by Simon & Schuster, 1230 Avenue of the Americas, New York, NY 10020. ■

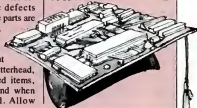


Alright, the Ugly Ones Are Free

Intel Corp., maker of the microprocessors in IBM's personal computers, is offering free chips, boards, and systems to educational institutions for use in classroom or academic research and development projects. The treebies, drawn from Intel's full line, were rejected for cosmetic defects only—Intel claims the parts are perfect, electronically.

Interested instructors should write a free-equipment request on school letterhead, describing the desired items, their planned use, and when the parts are needed. Allow

several months for the request to be fulfilled; also keep in mind that Intel will not process any requests until July 1985. Write to Emil Sarpa, Corporate Manager for Academic Relations, Intel Corp., 3200 Lakeside Dr., Santa Clara, CA 95050. ■



Simple answers to your questions about IBM Personal Computers.



If you're personally interested in personal computers, but want to know more, these definitions, descriptions and details should help.

"Just what is a personal computer, and how can I use it?"

An IBM Personal Computer is a computer designed for a person. It's a tool to help accomplish just about anything a person needs to do with information. It can help you start a small enterprise at home just as surely as it can help a corporate planner solve complex problems.



"Suppose I've never had my hands on a computer. How 'easy' will it be?"

As with any new tool, you'll want to get comfortable with your IBM Personal Computer before getting down to work. The nice thing is that the computer is on your side, interacting with you as you learn. Then you're running programs and feeling good with the results. It becomes clear that you've made a good investment, and you'll probably be telling your friends why they should get one.



"Are IBM Personal Computers simple or sophisticated?"



Both. Our systems have many advanced design features; they are there to make your computer simple to operate and to help make you more productive. As with a well-designed car, the computer is designed around you, the user.

"What kind of software programs do you have to help me?"

Perhaps the world's largest and most up-to-date library of business programs has been written specifically for the IBM PC family. And among the best

of this software is IBM's Personal Computer Software.

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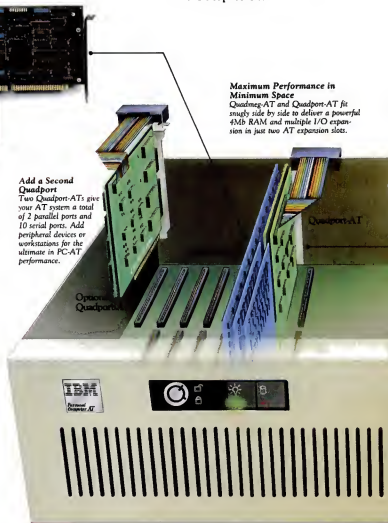
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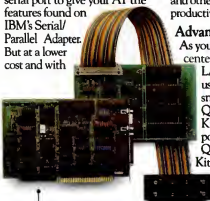
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CIRCLE 107 ON READER SERVICE CARD

Esther Dyson to Head New Computer Daily



Esther Dyson

NEW YORK—One of the computer industry's leading prognosticators and analysts, Esther Dyson, will head a new international, electronic computer publication designed to expand the breadth and depth of industry coverage. *Computer Industry Daily (CID)*, set to begin publi-

cation this summer, will be available on-line with a hard copy backup. It will be published by Ziff-Davis Publishing Company, New York, and distributed through MCI Mail.

Dyson, now president of EDventure Holdings, Inc., editor of the *RElease 1.0* which will be absorbed into *CID* newsletter, and host of the annual Personal Computer Forum, will be editor and publisher of the new publication. In addition to late-breaking industry news, *CID* will report on related hardware, software, marketing, and finance issues.

CID will be Ziff-Davis's first new publication since selling off its noncomputer consumer, special interest, and business properties earlier this year. Ziff-Davis also publishes *PC Magazine*, *PC Week*, *Creative Computing*, and *Digital Review*.

—By Charles Berman

22 New IBM Titles Ready

WALLINGFORD, Conn. — IBM has released a second batch of Personally Developed Software, adding 22 new packages to its collection of low-cost programs, most of which were written by IBM employees on their own time.

The programs, listed below, fall into several categories, or families.

Entertainment:

Crypto-Mania Puzzle Pac \$14.95
(requires *Crypto-Mania* \$19.95)
Liplocce \$19.95
Music 101 (Trivia from Mozart to Matown) \$19.95
Scattergrams \$19.95
Trivia 102 \$19.95

Education:

Adventures with Whale Numbers \$24.95
Private Tutor Presenter 1.1 \$19.95 (lets you run Private Tutor lesson programs but not au-

thor them, as with *Private Tutor 2.0*)
FORTAN Tutor \$19.95
Multiplication Tables \$24.95 (requires *Private Tutor*)

Productivity:

DB/Editor/Writer \$49.95
DOS File View \$19.95
FileCommand II \$19.95
INFOPC \$39.95
Personal Print Control \$29.95
Short Hand \$14.95
SuperC \$19.95
Utilities III \$19.95
(SORT, LOADRAM, SAVERAM, COMPARE, ERRORLOG, PATCH)
Word Proof II \$39.95

Programming:

DOS Enhanced DEBUG \$24.95
Object Library Maintenance \$19.95
Structured Assembler Translator \$34.95

Business:

Member Services \$29.95 ■

PC UPDATE by VIRGINIA DUDEK

NEW YORK — Borland International of Scotts Valley, Calif., has announced Version 3.0 of Turbo Pascal, which now operates at twice the speed of 2.0. "It's the fastest compiler in the solar system, probably even in the galaxy," claims Philippe Kahn, Borland's founder and president. Version 3.0 uses "turtle" graphics for the IBM version. Appearing as a triangle on the screen, the "conceptual" turtle replaces vectors and pixels. The upgrade includes optional binary coded decimal (BCD) support, a re-worked input/output procedure, a memory mapped editor, and a new manual.

Version 3.0 now runs on a wider range of MS DOS, PC DOS, CP/M 80 and CP/M 86 machines. Current users can upgrade to 3.0 by trading in their 2.0 disk for a \$39.95 credit, or the original 2.0 disks with 8087 support for a \$69.95 credit. The trade-in is being offered direct from Borland through June 1, 1985. A special new buyer price of \$69.95 will also be offered through June 1.

Kahn gave substance to the rumors of a Borland 1-2-3 clone and says that Borland plans to have compilers for BASIC, C, and Modula-2. Stay tuned.

Let's clear up what MicroPro of San Rafael, Calif., is planning for WordStar. Despite a less than perfect reception to WordStar 2000 and user's fears that their old favorite is being phased out, president Glen Haney promises revisions and a long-term commitment to the original WordStar. "The market should understand that we're building another product, not replacing one," says Haney. MicroPro envisions a three-tiered market for a full line of word processors that includes WordStar 2000 at the high end, WordStar in the middle, and a third as-yet unannounced product at the low end. "Our intent is to have three products on the best seller list," says Haney.

"WordStar is also evolving to a more transportable code base," adds Haney, noting that it's now written in C and Pascal instead of the original assembler.

Some short takes: Clarity Software, based in Austin, Texas, has released version 2.0 of 3-2-1 GO, a program that converts Lotus 1-2-3 and Symphony spreadsheets to models and data files for Execucom's Interactive Financial Planning System. Current users can obtain 2.0 for free...Power writers can replace the old MaxThink for the new version, 2.1, free of charge. Improvements include command additions such as write, view, directory, divide, join, and headings....Lotus announced an updated 1-2-3 Graphics Printer Library II, with 10 new drivers for printers and plotters including the HP LaserJet, HP ThinkJet, and IBM color graphics printers. It replaces release 1A. Updates are available only through Lotus dealers.

Be a contributor to PC Update. Write or call Virginia Dudek, PC Magazine, One Park Ave., NY, NY 10016. (212) 503-5265.

Speed Drills: The Test For Power Programs

If computers are about anything, they're about speed. Use one regularly, and you're guaranteed to develop a truly exquisite sense of impatience. A 10-second wait for almost anything else in the world rarely seems particularly onerous. Wait 10 seconds for your computer to do its stuff and you begin to consider filling it with dirt and turning it into a decorative planter.

Many of us impatient souls keep adding new hardware to satisfy our speed-lust. Manufacturers of hard disks, co-processor boards, disk-emulating RAM boards, and machines like the AT try to keep us whizzing along.

So do some software vendors. True, Lotus's 1-2-3 included plenty of features its competition didn't, but when you talked to someone who'd switched from *OtherCalc* to 1-2-3, the reason always seemed to be "The sucker's just so darned fast."

The Film of Features

Recently, though, the play has gone to "features." The current crop of advertising pits one product against others and stresses the Yesses in column A versus the Noes next door. We've seen a whole bunch of word processors that virtually claim to make writers obsolete, integrated packages purporting to do everything anyone could ever possibly need, and integrating software that promises to marry *WordStar*, 1-2-3, and *dBASE II* happily ever after. But what about speed?

Well, take *WordStar 2000*. It doesn't do quite everything, but it's got lots and lots of nifty features. But running it on a PC or XT is simply agony. At virtually everything from scrolling to

moving text, it is painfully, abysmally slow. One corporate response I heard—that it's no slower than *Samna Word*, or *MultiMate*—offers scant relief, since those two are pretty snail-like themselves. Many other feature-dripping programs tend to extract similar performance penalties: TopView is exhibit A.

Simpler, Tighter

Part of the reason for the profusion of slow programs is a phenomenon discovered by my friend the mainframe programmer. He began his computer career in the late sixties, when a room-size behemoth might boast all of 32K and programmers were vitally concerned about program speed and memory management. Making code simpler, tighter, and more ele-

the successor had a chance of figuring out exactly what he or she had in mind.

Elephantine 64K

A similar sequence of events took place in the microcomputer world. In the early days, when 48K seemed like a big memory and 64K positively elephantine, most of the good programs were little miracles performed by lone programmers writing in tight assembly code. Most of the popular applications for 8-bit machines, including *WordStar* and *VisiCalc*, were assembly-language jobs, often written by a lone old-timer who remembered the days of 16K mainframes.

With the advent of the PC's big memory address space and professional-quality compilers,



programmers often lack experience in optimizing code. In a variant of Parkinson's Law, their programs expand to fill the RAM available. The result is bloated low-performance vehicles such as *WordStar 2000* and *VisiWord*, past which such assembly-language performance machines as *XyWrite* can speed from a standing start.

No Unanimity

Programmers that I've talked to are not exactly unanimous on the issue of how best to produce applications programs. Many will tell you that programs written in anything but pure assembler are doomed to run like cold molasses. Others claim that it's simply a matter of artistry: With proper assembly routines to handle speed-critical spots, programs in languages such as C can be acceptably zippy.

But high-level purists believe that C or something like it is the only way to go. They're willing to sacrifice speed now for the sake of future portability. This attitude is not likely to win the hearts of those who aren't ready to trade their current machines for high-performance models.

In theory, every new software feature may extract some sort of performance penalty. Macintosh and Lisa, for example, often seem slow because of the extraordinary volume of information they have to keep track of to perform even the simplest operations. In practice, though, clever programming can usually keep even the most feature-laden program humming. And until super-powerful machines minimize the need for such cleverness, software developers ought to memorize the user's cry: Speed is what I need!

Today's "improved" microcomputers are still nowhere near as fast as the mainframes many young programmers cut their teeth on.

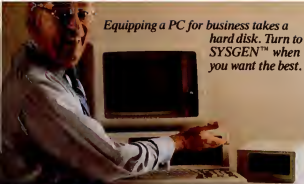
giant was a primary goal.

My friend left to try writing for Hollywood for nearly 10 years. Returning to the world of bytes, he was shocked at the changes he found. The new machines were so big and so fast that programmers rarely worried about hardware limitations. If one piece of code ran a bit slower than another, it was no big deal: Who would notice?

The important issue now was modularity: writing programs in neat little chunks that were easy to read and debug. Vital for group projects, modularity also meant that when a programmer left for a better job elsewhere,

many software firms hired teams of programming whizzes from the mainframe world to develop applications programs in languages such as C. Unfortunately, higher-level languages invariably demand overhead in both program size and execution speed. Compiling even a one-line Turbo Pascal program, for example, will get you a file larger than 10K. The equivalent assembler code might be all of 10 bytes.

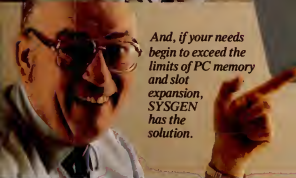
Worse, today's "improved" microcomputers are still nowhere near as fast as the mainframes many young programmers cut their teeth on. These



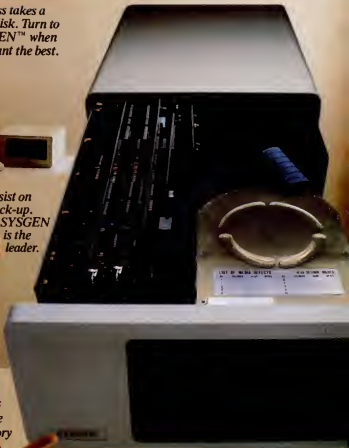
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Desperately Seeking Sales

BY CHARLES BERMANT

COCONUT GROVE, Fla.—Personal computers have boosted the sales of everything from art to zippers, but the machine's potential to improve sales training remains untapped.

Jack Levine, president of Thoughtware, concedes that not everyone is cut out for the high-pressure sales world. Levine has borrowed the concepts of the Thoughtware's popular management training software and developed a sophisticated program geared specifically toward increasing the productivity of salespeople.

Introduced at press conferences prior to Softeon, *Sell, Sell, Sell* is a two-part, multi-disk package designed to train salespeople and chart the

main of training seminars, which can cost companies upwards of \$500 per person. While gaining in popularity, these intensive sessions are often too much to take in one sitting. Furthermore, says Levine, "The biggest bugaboo is that people forget. If they want to remember what they've learned, they have to go back to scribbled notes on scraps of paper."

Sell, Sell, Sell focuses on how the sales representative uses the sales process. The program contains a self-assessment and an analysis of the user's necessary sales personality traits, including the ability to deal with rejection and make effective small talk with prospective clients. It also features an on-disk counselor that evaluates why a particular sales call might

ing in educational planning.

The 13-part *Management and Diagnostic Training System*, priced at \$3,995, is an all-purpose package which offers computerized advice in subjects ranging from personal interaction styles to stress management.

A majority of Thoughtware's 110 employees have psychology, sociology, or business backgrounds, with experience in the development of training programs that don't incorporate computers. In addition to its retail software, Thoughtware has developed customized PC programs to suit the needs of specific companies.

When asked to project the most optimistic sales figures for *Sell, Sell, Sell*, Levine said that 100,000 application and 30,000 training packages could be sold in the next year.

Birth of a Program

Sales isn't like child-rearing—there's not much dispute as to which procedures work best. Differences in technique usually boil down to semantics. For the substance of the program, Levine says he drew from "an amalgam of what was there," using input from ten different consultants.

The training portion resembles a slideshow, turning the PC into a desktop multimedia center. The content combines common sense and sales philosophy, putting the user in mock sales situations and giving immediate feedback to the chosen option. Even the best salesperson will make some errors. As one Thoughtware employee says, "If someone gets every question right, there's something wrong with the program."

"Transference is the biggest problem, applying the 'for example' situation to the real world," says Levine. "After a seminar, people go back to their old ways. But this program reinforces effective sales techniques on a day-to-day basis."

"We've seen a good response to the program so far.

The sales process is ripe for this kind of innovation. It's an inefficient process that hasn't been addressed by the computer."

Upending the Apple Cart

Unlike past Thoughtware programs, *Sell, Sell, Sell* is only available for the IBM PC and compatibles. The company has discontinued all of its Apple offerings because, according to Levine, "we are going after a strictly business market and there is no Apple in business. The business world is an IBM-compatible world." The program is targeted to those who already are using a PC in some other capacity.

At an average price of \$450,



Jack Levine

Thoughtware's products are high-end. While Levine acknowledges that the product price may drop slightly as the installed base grows, he does not believe there will be an across-the-board nosedive in software prices.

"Software costs must pay for product development," he says. "We compare the cost of this package with the cost of the alternative ways of accomplishing what the software does. These programs have a higher inherent value than just efficiency increase. They can increase effectiveness four or five times."

"In the past, sales has been untouched by technology. It's said that sales talent is a mystique—you either have it or you don't.

That's only partially true."

progress of their newly acquired knowledge. The training program measures the "desire to sell" that is essential for successful salespeople, while the applications portion helps implement strategy and provide day-to-day support of efficient sales techniques.

"Computers have been used to improve things like production or inventory control," says Levine. "In the past, sales has been a hand-crafted process, untouched by technology. It's said that sales talent is a mystique: you either have it or you don't. That's only partially true. Not everyone can be a great salesperson, but this program can bring everybody's skills up a notch."

Theory to Go

Most of what *Sell, Sell, Sell* is trying to accomplish has, up to now, been the nearly private do-

have gone badly.

In large corporations, Levine says, the program can be used to supplement, rather than replace, group instruction, giving the company the opportunity to "add specific training and corporate razamatraz." As for smaller firms, most have no formal sales training programs and can't afford to take their employees away from the selling process. In this environment salespeople can use the software as a self-paced program.

Levine is neither a salesman nor a programmer. He holds a Ph.D. in economics and has spent most of his career in the area of training and development.

In addition to founding Thoughtware in 1983, he also started two other companies, the Higher Education Management Institute and the Systems Research Group, both specializ-

"We decided waiting another decade for the standard in business software was too long."

Instead, Macola, Inc. has taken the Standard in Business Applications Software for *minicomputers*, from MCBA,* converted it to R/M COBOL for 16-bit computers, and created, we believe, the *Micro-Standard*.

Hundreds of microcomputer business applications packages from scores of programmers were rushed to market during the last ten years as the microcomputer became an everyday business tool.

Many were fine packages—filling niches, stop-gapping problems, allowing the businessperson to *maintain*—probably not drop behind, but definitely not surge ahead.

What was missing from these packages varied from package-to-package. Some lacked power. Some, simplicity. Others, clarity. Most lacked real integration.

Introducing Some Old Software

During those ten years, Mini-Computer Business Applications, Inc. (MCBA), was quietly establishing the standard for Business Applications Software for minicomputers.

Today, much of the new software developed by other companies boasts compatibility with MCBA's packages.

Macola, Inc., finding the current micro-packages unacceptable against the standards they sought, and realizing the time

involved in developing their own set of packages, approached MCBA, obtained the rights to convert the powerful minicomputer software, then did just that.

Thanks to Macola, the microcomputer industry can now run the *Micro-Standard* in the following financial software...

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CIRCLE 263 ON READER SERVICE CARD

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PFS:ACCESS runs on selected MS-DOS computers and on Apple IIe and IIfx computers.For a limited time, the MS-DOS version of ACCESS will include a \$25 rebate coupon for the Peritek® POPCOM® modem.

Visitor from the East: IBM's Japanese Junior

PRODUCT REVIEW

By Greg Brehm and
Steven Jacob

A look into the future? Well, maybe. As reported in the April 2, 1985, issue of *PC Magazine* ("3.5 Inch Drives Rise in East," Volume 4 Number 7, page 34), IBM Japan Ltd. has introduced a version of what just might be the new PCjr—the PC JX. This new machine contains two 3½-inch double-density microfloppy disk drives, each capable of storing over 730K of information. With two microfloppies, the system has more than a full megabyte of storage.

Cozy Compatible

The 8088-based computer supports impressive advanced graphics in both monochrome and color modes. An expansion chassis that fits neatly into the top of the PC JX allows it to accept a 5½-inch floppy. This added hardware gives it the ability to run some existing PC programs, and even to share data files between the 5¼-inch and 3½-inch floppies.

The JX comes with 64K of memory installed on the motherboard, along with two expansion slots. One allows you

to add 64K of RAM, and the other can add 128K more, bringing the system total to 256K. In addition, the system requires DOS 2.01.

Ins and Outs

Standard features on the JX include a monochrome adapter, two joystick ports, parallel printer port, infrared keyboard, audio output (with three-voice sound), light pen, cassette connector, and two ROM cartridge slots. The 102-key keyboard was designed for Japan, and it is very comfortable. The function keys run along the top of the keyboard. It has both a numeric keypad and cursor keys, all in an easy-to-use layout. The numeric keypad has the standard number layout with the asterisk, slash, comma, minus sign, plus sign, and Enter keys clustered around it—great for worksheets and programming. And the keyboard even worked with the PCjr's standard infrared link technology.

The JX cabinet is made of steel and appears to have been built by robots. A rubber support attached to the inside of the lid has grooves that line up with the add-in boards. If this support were misplaced the lid would not seat properly, but there are no markings on the lid to indicate where to attach the

support. The multilayered motherboard uses surface-mount chip technology for its intricate computer-designed printed circuits. In general, the PC JX's design is more solid and sturdy than that of the PCjr made and sold here in the United States.

The floppy disk controller is contained on a drive-expansion assembly, and resembles no other controller design we've seen. It connects to the motherboard through a cable to the expansion chassis that held the two 3½-inch microfloppies. The disk chassis contains the controller, fan, and slots for one or two microfloppies. The controller also provides the interface into the expansion chassis, which contained the 5½-inch floppy drive in the configuration we tested. DOS addresses the two disk drives as the A: and B: drives, and calls the 5¼-inch floppy the C: drive.

Ultimate Copy Protection

The JX offers enhanced graphics capability to monochrome and color users, micro floppy technology with half the physical disk size and double the storage capability, and a minimum of 64K main memory that is expandable to 256K. The cartridge slots accept plug-in ROM programs, as do those on

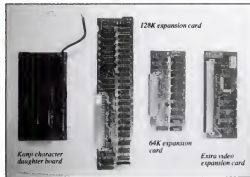


the PCjr. These ROM programs execute their functions with impressive speed, and they represent the ultimate in copy protection.

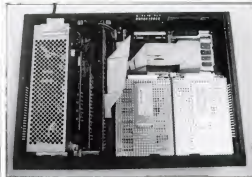
The JX contains the PCjr's frequently requested add-ons as standard features. It is modular, expandable, soundly designed, and built with quality. If this computer were introduced into the American market, it would sell very well. Add-on companies would be pleased since it offers yet another IBM peripheral market, both in board-level products (memory) and ancillary storage devices such as hard disks.

The JX is more than merely the first IBM computer to use 3½-inch disk drives. It's also a peek at the possible engineering, design, and manufacturing characteristics of personal computers yet to come from IBM.

Steven Jacob and Greg Brehm are, respectively, president and vice president of Legacy Technologies, Ltd., a firm specializing in hardware expansion units for the PC.



The PC JX Board members.



A view from the top: the JX's two 3½-inch drives, to the right.



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CIRCLE 326 ON READER SERVICE CARD

CROSSTALK

Adam Osborne: The Second Time Around

By Charles Bermant

WASHINGTON, D.C.—Adam Osborne has been called a lot of things, but no one has ever accused him of being boring or predictable.

Two years ago, the Osborne transportable computer was a vital part of the emerging micro-computer industry. It had some problems, such as the small screen, which forced users to scroll left to right to accommodate all 80 columns, but the idea was unique, and it came at a time when Compaq was just starting its engines.

Then, like a textbook example of how a business fails, the company collapsed. An ill-timed new product announcement made the company's regular offerings seem shabby. The bomb went off just as the IBM-compatible market was gearing up, and Osborne was never able to cut itself a slice of that lucrative computer pie.

The accusations flew as to who mismanaged what, with Osborne blaming the man he hired as his successor, Robert Jauch for the company's collapse. Today, Osborne is less willing to point the finger at Jauch and has actually recanted his more vitriolic accusations. He accepts some of the blame himself, as it was he who relinquished the reins of the then-thriving company.

"I no longer think that Jauch did these things deliberately," he said. "But I came from a different environment, where you learn of a problem on Monday and have it solved by Friday. The world he came from was different. His credentials were awesome, and I thought he was just what was needed to turn us into a multibillion dollar company."

"His techniques may have worked with canned peas," Osborne said of Jauch, formerly president of Consolidated Foods. "But they weren't right for high-tech."

Born Again

Now Osborne's back, with another idea. He's invaded the software market, selling quality programs for a fraction of what the entrenched companies ask. All software, he says, will soon be in the \$50 range, and he will lead the way.

"They won't be able to hold on very long," he says of manufacturers who charge \$500 for a software package. "They'll have to bring their prices down."

He's also democratized the packages, marketing the programs in a small, book-like format. Fittingly, his new company is called Paperback Software. And in a tip of the hat to the modern computer user's presumed rock-and-roll orientation, he's christened his populist word processing program *Paperback Writer*, after the Beatles song.

"Software price is based on perceived value," he told an audience in March at the Federal Office Systems Exposition held in Washington. "People are being gouged. But I'll sell you my best software package for \$70, and then, if you want, I'll sell you a fancy three-ring binder and a linen box for \$200. You'll still be ahead of the game."

Both *Paperback Writer* and the fancier *Executive Writer* seem to deliver on their original promise: They're spy programs that are easy to learn and use. Osborne doesn't look back with anger at what might have been, preferring to concentrate on his present endeavors. But he in-

sists he's not going to make the same mistakes again. He will personally control his business's growth this time and will take full credit—or blame—for whatever happens.

"I plan to stay on top of things," he says. "I'll control the company myself and will force through any changes in the necessary time."

Let's Make a Dealer

Osborne's programs are designed to be sold in bookstores. He admits bookstores "got stung" last year with software efforts, but he believes they'll soon become a major outlet for programs. He also expects that inexpensive software will be a big hit overseas, saying "if you think that a \$500 program doesn't go over well here, you should see how people in Britain react to one that costs £500."

Dealer support, he maintains, is a myth. His response is to make his programs easy to use, so that users need little instruction beyond what the manual offers. When help is needed, his company provides on-line help on a price-per-minute basis.

"People with straight faces are offering an unknown amount of service for a fixed fee," he says. "We offer service with our packages for \$1 a minute, with a \$5 minimum. All of a sudden, people discovered that they learned to read in grade school." He feels this policy will not hinder sales of his low-budget, unsupported programs because "once people see that the quality is the same, then they'll buy my programs and worry about support later."

But distribution may still be his weak link. And a bigger promotional push than word-of-mouth may be needed. "The



Adam Osborne

product [*Paperback Writer* and *Executive Writer*] is doing very poorly," says John Williams of Software Specialists in Washington. "I've sold only one in 2 months, and that customer wants his money back. The price is low and it's a good idea, but there's no marketing pull. A product still needs to have that pull."

Secret Sharer

"I agree with Osborne that prices will go down," says Williams. "But there's a middle ground between Osborne and Lotus. He's a publisher, not a developer. I can't see anyone who develops their programs in-house selling a program for less than \$150."

Osborne doesn't disagree; he states that software publishing should be more like book publishing.

"Publishers make their money screwing authors," says Osborne. "But there is a difference as to how a book publisher and a software publisher must treat an author. Software publishers must take more care, because the software author keeps the secret of how the product works with him."

"But having authors work on a royalty is a better idea than putting them on a salary. Those working for a royalty will work long and hard to get the job done quickly, and will stick with you until all the questions are answered. Someone on salary will stop working as soon as the job is done."

The Pirates of Singapore Cruise the Software Seas

PC's traveling
correspondent
finds boxes of
illegal booty.

By William K. Howard

SINGAPORE—While Hong Kong and Taiwan have been getting all the ink as the places to buy cheap PC clones and cheaper pirated software, a new Asian competitor is flexing its muscles: Singapore.

Perhaps the cleanest and quietest Asian city, Singapore is branching into the dirty under-

tronic, computers, video, and photography—legal and otherwise.

Wander into Kaichin Electronics Ltd. on the third floor, and you'll see a cardboard box filled with hundreds of floppy disks hand-labeled *WordStar*, *dBASE II*, *1-2-3*, *RBase 4000*, *Norton Utilities*, and so on. You name it, they've got it. On the other side of the tiny shop is a box filled with Apple programs next to a sleek brown and beige computer that doesn't look like anything available in the United States, but seems to be Apple-compatible. The IBM PC next to the IBM disks looks to be true-blue IBM. It appears that

counter lists what's available. When this writer visited the shop in late winter, prices were 10 Singapore dollars for IBM programs, 6 for Apple.

Your money buys only the program disk, no reference guide. But the stores, Kaichin especially, also offer third-party books (Sybex guides are especially well-represented) for 10 to 20 Singapore dollars each. Print quality on the inside pages is good, although the paper is thin. Some of the color covers are a bit off, having the tonal quality of a 20-year-old color photograph. The best deal of all is MicroPro's *WordStar Customization Notes* (the good stuff

practical problems with the Singapore connection. The third-party user guides are available only for the most popular programs; for the others, you're on your own. Much of the pirated software one finds is one or two versions removed from the current release.

Software isn't the only thing that could trip up the unwary in Singapore. Bargain-hungry American shoppers should beware that TVs and VCRs use a different broadcast standard than the one favored by U.S. broadcasters, not to mention different voltages and cycles. Some digitally-tuned radios may not lock into U.S. frequencies properly. And it's not unheard of for a merchant—not necessarily in Sim Lim Tower—to slap a famous-maker logo on a rip-off boom box or camera and print up a phony guarantee.

The days of brazen software piracy may be numbered, however. Singapore aims to be a legitimate software and hardware development site, and the Singapore government is in the midst of overhauling its Copyright Act to meet U.S. approval. A bill before the U.S. Congress would give foreign chip makers and software publishers only as much protection in the States as the countries afford U.S. products overseas. The English-language press in Singapore devotes considerable space to the issue of software and hardware piracy in Asia. It also lends space to reports on American countermeasures against the software piracy threat.

One PC-using U.S. businessman, who passes through Singapore several times a year while on assignment for his Fortune 200 employer, explained that the pirate shops do serve at least one useful purpose. If he's interested in buying a program for his department back in the states, he'll try out a pirated copy first. If the program does what it's supposed to, he'll turn around and order a batch of legitimate copies. "It's less hassle than trying to borrow a demo copy from a computer store," he said. "If it doesn't work out, I'm out only the price of a couple of drinks."



side of the computer business. While this tiny island city-state at the southern tip of the Malaysian peninsula is still a David compared to Hong Kong's Goliath, its move doesn't augur well for software publishers. And at the hardware level, it's positively disastrous for Apple, which is the counterfeiter's computer of choice.

The place to be in Singapore is Sim Lim Tower, a modern, multi-story electronics center at 30, Jalan Besar. Sim Lim Tower is just like a shopping mall in the United States, except everything here is devoted to elec-

tronics, computers, video, and photography—legal and otherwise.

Low-Priced Spreadsheets

The store charges 10 Singapore dollars for IBM program disks, 5 for Apple. (A Singapore dollar is worth about half a U.S. buck.) The pirates have developed a sense of which computers are hot and charge accordingly.

Down on the basement level is Challenger Microcomputer Products. Here the software is stashed behind the counter; a looseleaf notebook on the

MicroPro never put in the manual), which used to cost upwards of \$400 for nothing more than a bunch of patch points. Ten Singapore dollars will buy this find.

Hardware is also available at both stores, although the majority of computers, drives, boards, and peripherals appeared to be aimed at the Apple consumer market.

Singapore Slings

Aside from the fact that bringing the pirated software into the United States is downright illegal, there are some

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4. With every product you get friendly, expert technical support. Have a question? You'll be glad you bought from 800-SOFTWARE!

5. We'll match our competitors' prices on most products. We *never* cut service.

6. We never charge extra for credit card purchases, nor do we process for payment until the product is shipped. (Our competitors don't make this claim!)

7. You'll automatically receive our Technical Support Newsletter—a great way to stay up-to-date.

8. We are members of the Better Business Bureau and the Direct Marketing Association.

9. We want your business. And your repeat business. Which is why we work so hard to keep you happy. Give us a call and let us *prove* it!

CHECK OUT ALL OUR INCREDIBLE PRICES:

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BBasic 4000 \$239	SuperCalc 2/3 CALL	Horwath Color/Graphic Card \$199/\$235	IDS Accounting \$299/mod.	
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CIRCLE 236 ON READER SERVICE CARD

CALENDAR

JUNE

2-5

Consumer Electronics Show sponsored by the Electronic Industries Association's Consumer Electronics Group. Will feature exhibits, workshops, seminars, and conferences. To be held in Chicago, Ill. Contact: Consumer Electronics Show, 2001 Eye St., NW, Washington, DC 20006, (202) 457-8700.

17-19

PC Expo

Will feature hardware, software, accessories, and conferences. To be held at the New York Coliseum in New York City. Contact: Steven Gross, 333 Sylvan Ave., Englewood Cliffs, NJ 07632, (201) 569-8542, (800) 922-0324.

24-26

Videotex '85 sponsored by Online Conferences Inc. Conference and exhibition featuring videotex manufacturers, business, and consumer applications. To be held at the New York Hilton in New York City. For more information contact Online Conferences, 989 Ave. of the Americas, New York, NY 10018, (212) 279-8898.

JULY

15-18

The National Computer Conference sponsored by AFIPS, Association for Computing Machinery, Data Processing Management Association, IEEE Computer Society, and Society for Computer Simulation. To be held at McCormick Place in Chicago, Ill. The theme for the conference is "Technology's Expanding Horizons." For registration and information call (800) NCC-1985.

AUGUST

19-20

Future Computing's Graphics Forum and Seminar. To be held at the Hyatt Regency Embarcadero in San Francisco. Overview and forecast of personal computer graphics marketplace. Contact: Future Computing, Inc., 8111 LBJ Freeway, Dallas, TX 75251, (214) 437-2400.

NOVEMBER

14-16

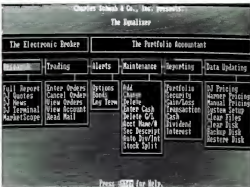
Corporate PC Conference. To be held at the Los Angeles Airport Hilton in Los Angeles, Calif. PC hardware and software for large- and medium-sized corporations. Contact: Data Processing Management Association, P.O. Box 3727, Santa Monica, CA 90403, (213) 450-0500.

Charles Schwab Launches Two Financial Programs

BY ROBIN WEBSTER

SAN FRANCISCO—Discount stockbroker Charles Schwab & Co. is attempting to tap two powerful images—equality and independence—with the intro-

Warner Computer Systems stock quotes (15-minute delay or real-time), trade stocks through the Schwab computer network, and receive automatic notification of important events (such as the deadline for exer-



duction of its first software packages for individual investors.

One program, called *The Equalizer*, is intended to make individual investors feel as if they are on the same footing as the Wall Street pros.

Professional investors have almost immediate access not only to the usual stock market quotations, but to more comprehensive information sources that determine whether they buy, sell, or sit tight. Schwab's idea is to allow individual investors to use *The Equalizer* to access such highly regarded services as Standard & Poor's MarketScope, which is updated continuously during the day.

"This is a first for the individual investor," says Bill Gillis, head of Schwab's Technology Services group. "The S&P service is a very powerful market intelligence/analysis tool that has previously been used primarily by professional investors. Now, it is one of the major services that will give our customers a total investment picture."

Equalizer users can also access the Dow Jones and/or

cising a specific stock option, or a reminder that a certain account is about to roll over).

The Equalizer costs \$199 and was developed in cooperation with Teleware Software. You'll need 128K RAM on your PC-XT.

Financial Independence

The second program announced by Schwab, tempting-ly called *Financial Indepen-*

dence, offers a range of personal financial planning facilities. The many-featured program, which retails for \$299, operates on an IBM PC-XT or compatible with 256K RAM.

"We spent a long time evaluating personal financial programs already out on the market—we looked at maybe 50—but we didn't see anything suitable for our needs," says Gillis. So, in the end, we decided to develop our own unique package."

Financial Independence, which was actually written by Multisoft Corporation, has four major components: a budget manager, stock investment manager, financial goals manager, and a tax estimator.

The budget manager can keep track of up to 150 accounts and, like the stock investment manager, will automatically transfer tax-related information to the tax estimator section of the program. The financial goals manager seems geared to reducing some of the stress usually encountered when trying to compare loan types and options.

To assess how much tax you'll have to pay on your hard-earned profits, the tax estimator records all tax-relevant data from the other modules, and allows you to play "what-if" games with the data. Although similar to a spreadsheet in concept, the program manipulates tax data using on-screen representations of major tax schedules (including the 1040). ■

Finishing the Symphony

CAMBRIDGE, Mass.—Lotus Development Corporation recently announced two *Symphony* add-in products that help fine-tune and enhance its best-selling integrated software package.

Symphony Spelling Checker and *Symphony Text Outliner*, both designed to enhance *Symphony*'s word processor, represent the beginning of a planned series of *Symphony* add-ins that will soon be available to consumers. The spelling checker

features the 80,000-word Merriam-Webster dictionary and an optional British word list. The text outliner add-in integrates an outlining function into *Symphony*'s word processing module. It automatically creates a table of contents for a finished document and reorganizes the subheads and text when you reorganize the outline's main headings.

The spelling checker requires a minimum memory of 512K of RAM and two disk drives. The text outliner requires 384K and two disk drives. Each requires *Symphony* and both retail for \$139 each.

—By Virginia Dudek



Kensington introduces the only personal computer accessories that protect your PC from power surges and spikes, eliminate line noise, dissipate static charges, organize that annoying tangle of power cables, provide a swivel for your monitor, and even make your data communications more reliable.

Master Piece. and Master Piece.Plus.

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251 Park Avenue South, New York, NY 10010.
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See us at Spring Comdex in the East Hall, Booth 3432.

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Company Offers FREE OVERNIGHT DELIVERY!!!

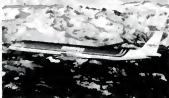
New customer service policy expected to set a new standard in the mail order industry!

BY MICHAEL CHRISTOPHER

GARDEN CITY, N.Y.—Mr. David W. Pasternack, President of Logissoft, a major IBM PC software and hardware distributor, has announced the inception of a unique new customer service policy. . . . free overnight courier delivery on their entire product line.

In a recent interview, Mr. Pasternack stated that "We feel our new free overnight delivery service will set a new standard in the computer software mail order industry. In a study we conducted, we found that in addition to competitive pricing, expedience was a factor utmost in our customer's minds. Whether their order was \$300 or \$3000, the need to get their package as soon as possible was the same. Under our old procedures, between processing and shipping time, it could take up to a week and a half to two weeks for an order to arrive. With our new courier service, an order can be processed, shipped, and arrive in our customer's hands in only 3 working days. . . . at no additional charge!"

The company is using Emery Worldwide to handle the large number of packages being shipped each evening for next day delivery. "We chose Emery for their competitive pricing structure and excellent delivery record", said Mr. Pasternack. Emery was quoted as saying, "This makes Logissoft the largest single Emery account in the New York Metro area.



LOGIC TIP OF THE MONTH

Choosing software can be mind-boggling. With the proliferation of publishers, how do you choose. Analyze your needs. . . . what specific tasks do you want to perform. Read the software reviews; an excellent way to evaluate a package. Ask around. . . . you'd be surprised how many associates may be using a package similar to your application. Finally, choose the best package (not always the most expensive). Upgrading will end up costing you more. Remember the key word is research.

TOLL-FREE SUPPORT A Smashing Success

GARDEN CITY, N.Y.—A survey of Logissoft's toll-free technical support policy was done to see if it warranted the continued costs of the 800 toll-free number, personnel costs, etc. After careful monitoring of these calls (both pre-sale and after sale) it was found that 92% of the calls were for legitimate technical support questions rather than for answers already contained in the softwares' operations manual. As a result of the survey, the decision has been made to continue toll-free support as an important part of their customer service.

This service consists of assisting with:

- Hardware requirements
- Initial boot-up procedures
- Initial software configuration (printers, disc drive, etc.)
- Back-up procedures
- Defective program determination
- Alternative program recommendation
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Logissoft's Lowest Price Guarantee Still Effective

GARDEN CITY, N.Y.—Logissoft, Inc. has indicated that their long time policy of guaranteeing the lowest prices in the mail order market is still being offered and will not be affected by their new free overnight delivery service. "We will continue to beat any price by \$10" a company spokesman said. "We'd be crazy to fool with success", he stated; "since the inception of our lowest price guarantee, sales have skyrocketed."

When asked how Logissoft could afford to give their customers free overnight delivery plus beat any price by \$10, they replied "Buying Power". "Very simply", they said, we buy at the best possible prices and pass those savings along to our customers".

CONTINUOUS STATIONERY: BIG BUSINESS, But "Where's The Class?"

NEW YORK—The growth of Logicforms, Inc., a member of the Logic Group, has been phenomenal. Mr. Ralph Corso, President of Logicforms explains why. "Up until now, buying continuous stationery through the mail has been a take what's available situation". "First off", he said, "almost all mail order firms offer only stock letterheads & envelopes with limited typesets, colors and stock logos from which to choose, but, 'where's the class?'"

"The individual style and design of a letterhead", said Mr. Corso, "reflects the professionalism and personality of a company and should not have to change because they now have a printer and the need for continuous stationery. While other mail order firms are limited in the variety they can offer, Logicforms specializes in custom stationery. Logicforms offers a large selection of quality paper, ink colors and special effects such as thermography, blind embossing, foil stamping and multi-color printing." Mr. Corso went on to say that

"whether a customer chooses to supply his own artwork or printed letterhead, or wishes to select from our vast array of stock designs. . . . We are the Logical Choice".

For a free sample/pricing kit and a handy re-usable shipping envelope for artwork, simply call toll-free 1-800-645-3491 or send a sample of your current stationery for a free firm price quote. Mail to Logicforms, Inc., 300 Garden City Plaza, Garden City, N.Y. 11530

HOW TO LOCATE ANY DOCUMENT BY PHRASE OR WORD IN 2 SECONDS



4-1-1, The Retrieval System by Quadsoft

Almost instantly you can solve the problem of trying to find information buried somewhere on your PC hard disk. Because now there's 4-1-1, The Retrieval System, the powerful new package by Quadsoft designed to find any document in 2 seconds or less.

Document Retrieval. 4-1-1 works in conjunction with popular word processors, including Quadsoft's Freestyle, The Outline-based Word Processor, to maintain a data base of every word used in every document filed with the system. Documents can then be located according to content rather than file name.

Document Security. With the document security system, individual documents can be locked for access only by those who have the proper password.

This prevents unauthorized access to sensitive documents, such as confidential letters, personnel records or financial information.

Document Archiving. 4-1-1 document archiving system backs up files to floppy disks from your hard disk and provides an online index that tells you which floppy disk the file is on.

4-1-1, The Retrieval System provides hard disk users an organized approach to maintaining a large data base of documents or other ASCII files. 4-1-1 operates on the IBM PC or compatibles and requires 256K memory, one floppy disk drive, and a hard disk. Suggested retail price is \$149. For more information on Quadram's growing library of powerful, easy-to-use productivity tools, visit the dealer nearest you. Or contact us at 4355 International Blvd., Norcross, Georgia 30093 (404) 923-6666 Ext. 201.



QUADRAM 

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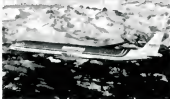
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Junior and Edsel: Two of A Kind Together At Last!

Now I know what it must have felt like to own an Edsel. I am the disheartened owner of a product whose announcement was anticipated with reverence, whose introduction was greeted with ridicule, and whose demise was cited as proof of the sagacity of the American public. I refer, of course, to the PCjr.

Sure, my discontinued Junior will take me as far as it ever could, but now everybody on the block snickers when I take it for a spin. "Poor guy," folks chuckle. "And he still thinks people will take his pitiful scribbles seriously?" It's a little like reviewing Maseratis for *Car and Driver* while tooling around the neighborhood in a '59 Rambler.

Well, snicker those who will. Owning Junior has taught me many significant lessons about the world of computers. Let's hope the industry has learned them, too.

• What's in a name? Plenty!

The perfectly charming sobriquet "Peanut" captured the public imagination and garnered millions of dollars of free publicity before the product's introduction. But no. Many Big Blue suits were evidently stuffed with the offspring of egomaniacal parents who'd foisted their monikers upon the next generation, thereby creating monsters bent on a form of public revenge. (Trivia addicts will recall that the Edsel was named for a son of Henry Ford.)

But who wants a junior anything? Would you puff with pride of ownership boasting about your subcompact Mercedesjr, your minisupercomputer Cray-1jr, or your condo in the Ritzjr?

• Don't let product designers steal the show.

The Edsel's most evident feature was its infamous "Ford-sucking-a-lemon" oval grille. Junior's was its "bloody Chiclets" keyboard. Neither machine ever recovered from arrogantly putting its most egregious design error right up front.

IBM's replacement keyboard had a better look and feel, but its dumb two-press (Fn, then a number) function key surrogates appeared on only one other machine I can think of, which turned out to be the only other giant 16-bit home computer flop, the TI 99/4A.

• Don't play games with essential options.

IBM stole a page from the auto industry's old pricing practices—a dangerous move in these days of well-equipped Japanese imports. Since the advent of the original PC, base prices have always been tailored to sound extremely attractive—until you discover the machine will barely get you out of the garage. The original plain-

vanilla PC, for example, included a grand total of 16K RAM and a cassette port. Every other form of mass storage and I/O was an extra-cost option.

Junior carried this insanity to new depths. The low-end model had only 64K, a version of BASIC that didn't take advantage of any of the machine's advanced features, and no disk drive. It was good only for playing the half-dozen games available in cartridge form and teaching the buyer how to install all the essential "extras" he should have bought in the first place.

The enhanced model had lots of built-in stuff—all with catches. The printer port worked only with a third-rate thermal device, and a standard port went for a hundred smackers. All the rest of the connectors were flimsy nonstandard Berg models that required \$25 cables to become accessible. And adding memory or a disk drive to a typically configured system required an expensive auxiliary power supply.

Even the infrared keyboard wouldn't work straight from the box. As PC contributing editor



Winn Rosch has noted, "Junior is probably the most expensive product sold with the famous legend, 'Batteries not included.'"

• Don't tax the engine beyond its means.

I don't think this was one of Edsel's problems, but it sure was with Junior, whose designers forced the poor 8088 microprocessor to work double overtime. Because the machine lacked Direct Memory Access circuitry (a chip or three to share some of the work), the 8088 was forced to run the video display, the disk drive, the keyboard, and the communications port all by its lonesome.

It sometimes protested vocally. Attempts at typing during a disk access set the machine chirping like a demented sparrow. And trying to download incoming communications directly to disk called up unfortunate memories of Charlie Chaplin's final breakout on the assembly line in *Modern Times*. You half expected to see the 8088 marching in front of the machine with a picket sign reading "UNFAIR!"

Any microprocessor can be pushed beyond sensible limits. Extra points for further research: check out the Motorola 68000 as used in the Macintosh.

On the other hand, look at it this way: Ford made parts for the Edsel for a while, and IBM will keep your Junior on the road. It won't ever run like an AT, but it ought to keep getting you where you want to go.

And who knows? In 20 years, you may be able to swap that original high-style chiclet keyboard for some other gorgeous deco item—like, say, an Edsel grille. ■

Art for NEC's Sake

"The medium is the message" is one expression advertisers would do well to heed, because the medium used in an ad sometimes carries a message that works against the interests of the advertiser.

Consider this exhibit: A colorful spread that NEC recently ran in *Fortune*. Its centerpiece is a graph with bands of five colors, depicting NEC's growth from 1980 to 1984 in the areas of computers and communications.

The ad's verbal message was: "The new information age is built on C&C, the merging of computers & communications." But what catches the eye most is that this simple graph was rendered for NEC as a painting, signed by Kenneth Noland, an artist noted since the 1950s for his hard-edged geometric style.

An NEC personal computer could have produced the graph for far less than Noland's fees. What's the matter NEC? Don't you trust your own computers when you have to communicate a message? ■

INTRODUCING 5

**WE INTERRUPT
PRODUCT
BRING**



DOWN TIME by WINN L. ROSCH

A Pair of Winchesters Beats One Streaming Tape

Tape backup for your PC's hard disk isn't a convenient spare tire: it's more like carrying a bicycle in the trunk. When your system goes flat, the backup tape drive is only a means of pedaling away from the worst of the disaster.

The tape cartridge by itself won't get your system running again. If you're lucky, your backup software will let you pull files off the tape one-by-one. You can transfer a few to floppies and go on from there, but that solution is like riding a bike on a bare rim. You can't handle any serious computing. More than likely, you'll have to wait until you get your hard disk up and running again—hours, days, or weeks later.

Cheap Tape

You've heard the widely promoted advantages of tape: There's nothing better and faster and more convenient and on and on. Tape just may cure all the diseases of mankind. Most of all, however, the promoters emphasize price. With a little fingerwork, you can find the latest super-low-cost tape unit, the little Irwin 310 10-megabyte tape drive, advertised for \$500 in a mail-order catalog.

That inexpensive tape system costs so little because you've already got part of the system in your computer. It uses the floppy disk controller to run the tape. This is an economical strategy, but you do pay a price for it: The controller expects to receive data at the same speed as your floppy disks—slowly. The little Irwin saves you disk-shifting time and little else.

Moreover, onrushing technology has a way of juggling price comparisons. The same ads that list those tiny tape back-

up units at bargain-basement prices also push half-height hard disks at comparable, competitive, even cutthroat prices. Even without your pocket calculator you should be able to tell that if your budget will stretch to cover a hard disk with tape backup it might also cover twin hard disks.

Double Protection

By now, the best backup system should be obvious. Do what the military, the space program, and your stingy grandmother do. Get two of everything, including hard disk drives. When

no current software will aid. You'll have to remember to copy all the important files you need to the spare disk.

Two half-height hard disks will fit into a single PC drive slot. If you have an XT, for instance, you can rip out the old Miniscribe (or whatever full-height drive IBM installed) and replace it with two 10- or 20-megabyte half-heights.

Just because they fit into your plain PC doesn't mean that a pair of drives will happily work there, however. The standard PC power supply is only marginally capable of running a sin-



thinking the new low-power tape backup systems will fare any better. Even without a hard disk sucking juice out of my system, an Irwin tape drive made my PC's power wobble. Whenever the Irwin's tiny motor switched on—every few seconds during backup—my monitor flickered as the voltage in my system dipped precariously close to crash level. No matter what backup option you decide to adopt, you would be well advised to add power.

Balancing Alternatives

Although I see dual hard disks as the ultimate backup system, tape does have several advantages you should consider before buying anything. Tapes are removable and transportable. You can keep several backup copies on separate tapes. You can send a tape to a cohort in Nome, Alaska more easily than you can move your entire computer system. And the capacity of a tape system is essentially unlimited: Just slide in another tape and keep going. You can also secure tapes merely by locking them away.

With a little creativity, though, you can duplicate some of these advantages with a redundant disk system. You can make secure backups by hiding files on the disk (using DOS function call 43) or by physically removing the hard disk from your system and locking it.

And the new half-height hard disk drives are tough little critters. If, in a pinch, you need to transfer 10 megabytes of files across the continent, you might mail the whole disk drive. Just think of the disk drive as a cartridge with the mechanism built in—or as a spare car you can carry in your trunk. ■

The best backup system should be obvious—get two of everything. When one dies you have another to depend on.

one dies, you have another one to depend on. When the worst does happen, just switch drive letters and send the malfunctioning drive out for repair.

A second hard disk can match the cost-cutting advantages of the little tape drive without the speed disadvantage. Most hard disk controllers are designed to handle not one but two Winchesters. Although these controllers may require identical disk systems—the same number of sectors, tracks, and platters—that's exactly what you want for a backup system.

Hard disk controllers operate at ten times the speed of those for floppies. Your backup hard disk, hardly coincidentally, operates at the same speed as your main system. Hence, a redundant backup enforces no additional speed penalty. Operating the redundant system will be your job, however, and one that

gle hard disk, even the newest low-power drives.

Controlling the Controller

In my trials and tribulations, I've found that even the controller affects the ability of a PC to handle a hard disk. A Xebec controller caused my standard 63.5-watt PC to behave erratically, if not irresponsibly. Every so often it would scramble the directory of the hard disk, an effect that folks with weak hearts might want to avoid.

When I replaced that controller with a Data Technology Corporation 5150BX, however, the system purred along perfectly, despite the extraordinary load of two floppies, a hard disk, 640K RAM, and a card in every expansion slot. No doubt another hard disk, with its continuously running motor, would have sent even that happy system over the brink.

But don't be misled into



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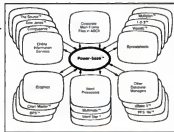
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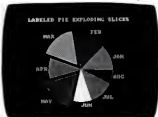
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Interactive Reader Update

PC Magazine's new Interactive Reader Service bulletin board is an unmitigated success—thanks to you. In response to your suggestions, we'll be implementing several new features.

PC Magazine's Interactive Reader Service is off to a flying start—nearly 100 callers a day during the first few weeks. We started out with just the Programming columns, added some User-to-Users, some Spreadsheet Clinics, backloaded some other big macros, and now we're sailing. And we'll be happy to listen to your suggestions on which of the older programs and things to put on the board. We put the index to PC Volume 3 up there already. Many readers have requested an index; PC-IRS to the rescue! Now you can download the index if you really want it. We may eventually put up a program that allows you to search the index on-line.

PC-IRS has also been a fantastic conduit for information from you to us. We've gotten hundreds of messages from readers: good suggestions, editorial comments, User-to-Users, pleas for help—the works. A surprising number of you placed your very first modem call to our bulletin board, got the hang of it, and called back for downloads. For those of you who have trouble with file transfers, we're working on a feature article that will describe how to use our system with a number of popular modems and communication programs.

Several PC-IRS users suggested that we put up an electronic version of PC News, with fast-breaking stories and the text of press releases as we receive them. It's not a bad idea, but I wonder how often you would call, and why. After all, the PC News section closes a month later than the rest of the magazine, so the breaking news is typically only a few

weeks old. Do you really need it sooner than that? There are other sources for the kind of fast-turn industry news that some of you need. It's easy for a magazine to try to be all things to too many kinds of people. Something generally suffers for



Bill Machrone

it. Still, I'd be interested to hear other opinions on this subject.

Any Messages?

A number of callers have also suggested that we make PC-IRS a full-blown remote bulletin board system (the software we are using is based on the public-domain RBBS) that allows users to leave messages for one another. My feeling is that there are more than enough boards that serve this purpose, locally and nationwide, maintained by dedicated sysops. Our objective is to communicate magazine-to-reader and reader-to-magazine. We're not looking to go into com-

petition with CompuServe, The Source, or any PC-oriented user groups. Besides, any time we spend monitoring your back-and-forth communications is time stolen from bringing you new articles and items of interest. Therefore, there will be no full message system.

A few users have asked for an 800 number for PC-IRS. Well, the caller log shows that nearly everyone is calling from work or at least during business hours. Your messages indicate that many of the downloaded programs will be used to benefit yourselves at work or your employers. Given the heavy business and professional bias of our readership, that's hardly surprising. So I view your use of PC-IRS as a business-to-business transaction and certainly worth the expense.

One thing we'll try to spare you is the need to continually call the Interactive Reader Service just to see what's new on it. We're working out the details of a section in PC News that tells you what's been added.

Comparison Test

Head-to-head product testing is a vital part of PC Magazine, one that consumes an unbelievable amount of time and expense. Not that all the expense is ours—you're putting a lot of dollars on the line, checking out new products. In some cases, you're relying on a manufacturer's good name, hoping that the next product will be as good or better than the last one. Other times, you read the reviews, compare notes, and draw your own conclusions. From now on,

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CIRCLE 101 ON READER SERVICE CARD

The Mouse That Roared

A recent "rodent infestation" at PC has given pointing and clicking devices a stronghold alongside the venerable keyboard. But who'd have thought that using a mouse would change Machrone's life?

I think my PC just caused me to mutate. No, it wasn't the X-ray emissions from the screen. It wasn't some fierce new version of mind control software. And it wasn't the chemicals that soaked into my fingertips after I last attempted to change a printer ribbon. It wasn't even the noxious cloud that my Enhanced Graphics Display emitted before it ceased to function.

It wasn't a nefarious plot and it wasn't a Kafkaesque nightmare. It was a mouse.

PC's editors have just come off an incredible binge of mousing, as we pointed and clicked our way through TopView. Then we segued into a special issue on business graphics, so it wasn't yet time to put the mouse away. GEM is on the way, to be followed by Windows—more mousing.

Murine Metamorphosis

I first noticed the transformation as I was reading a screenful of text I had written. I wanted to move the cursor down to the bottom of the screen to revise a word or two, and my right hand instinctively twitched toward the mouse instead of for the cursor keypad as usual. I was puzzled. I sometimes focus rather intently on what's before me on the screen, losing awareness of my surroundings. My usual response under such circumstances is one of recidivism, in which my left pinky twitches toward the Ctrl key. These ancient *WordStar* habits die hard—it's been a year and a half since I started using *xyWrite* regularly.

Why then the sudden change in behavior? I can only attribute it to some deep

psychophysiological changes. When I use the mouse, it's a disembodied sensation, almost like watching someone else's hand as it targets and clicks on characters quickly, accurately, effortlessly. And that's what's wrong.



Bill Machrone

My mom, of course, always wanted me to be a doctor. I, more cognizant than she of my motor skills, especially eye-hand coordination, firmly resisted—after all, there were human lives at stake.

Despite this handicap, my ring finger can now beat out a tattoo of double clicks on button 3. My palm glides the mouse over its blue-striped domain as if it were born to the task. My eye sees the desired spot on the screen and my hand just takes the cursor there. My right hand and forearm now feel, I don't know, *different*.

Everything is fine while I'm in TopView or using one of the graphics packages that understands mice. As

soon as I get to my favorite application programs, though, it's back to the old cursor pad. Or so I thought. Mouse Systems offers a nifty little utility called Designer Pop-Up Menus with its mouse. It solves the problems of adapting the mouse to existing programs. First, it translates mouse movement into the keyboard characters that your program understands. Then it allows you to define numerous functions that would normally require one or more keypresses and stores them in a memory-resident program that you load before running your application. Whenever you press button 1, a menu of the available functions appears in a window over your application program. You select the one you want and click button 1. The program executes the stored function as though you had typed it at the keyboard. You can also define nested menus and redefine the mouse buttons at each level. Of course, you still have all of the programs's normal functions available from the keyboard, so you can use whichever is more convenient. Functions that mark and move blocks of text make the most sense for the mouse. It's like using a food processor instead of slicing by hand.

The Mouse System mouse comes with a set of predefined menus for popular programs. In addition to several editors, it includes one for Lotus's 1-2-3. It's a surprising pleasure to roar around inside your spreadsheets at many times the repeat rate of the cursor keys. Instead of lazily following the highlight bar as it cruises through your figures, you watch

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CIRCLE 245 ON READER SERVICE CARD

you'll find all of our benchmark tests on PC-IRS, complete with documentation files and some sample results. Armed with these resources, you can evaluate new products on your own and make val-

id comparisons to our published results.

One of the more interesting benchmarks to come our way was written by CORE International, Inc., a value-added PC dealer in Delray Beach, Florida. It

simply measures the track-to-track and average seek time of a hard disk. Its purpose is to weed out some of the junk drives that are currently finding their way into the PC AT supply stream. Too many users have no way of knowing whether the drive they just bought actually meets AT specifications. This program cuts through the baloney and gives you the hard numbers. It's now on PC-IRS. I hope that it will be disseminated through user groups and bulletin boards and put to good use.

Sympathetic Vibrations

Speaking of interactive readers, we hit some kind of nerve when we first ran the Spreadsheet Clinic in the early part of this year. Our first shot at a User-to-User approach for spreadsheets was a two-issue experiment, to take your pulse and gauge your interest. Well, you just about blew out our sphygmomanometer, responding with an incredible wave of submissions. We're glad to provide a forum for interchange on this critical application of personal computing. Although this field is dominated by 1-2-3, don't be shy about telling us how to make any spreadsheet or integrated package work.

You'll be pleased to know that contributing editor Jared Taylor has agreed to edit and test the submissions to Spreadsheet Clinic. Jared has considerable depth in the world of corporate finance and banking and does not present-value calculations during breakfast—in his head. Meanwhile, if you've found an impressive shortcut or discovered a way to do something that they said couldn't be done, send us your submission. Remember, you can submit your gems on disk or through PC-IRS. Both are eligible for the \$25 disk bonus because they save us the trouble of rekeying.

Et Cetera . . .

Are there any other topical areas that you feel are right for a forum or formal interchange in *PC Magazine*? Databases? Graphics programs? It's almost silly to ask, because you, as a group, have never been shy about stating your preferences. That's why it's such a pleasure to put this magazine together for you, the interactive reader. ■

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TRANSPORTERTM

CIRCLE 333 ON READER SERVICE CARD

FAST YEAR IN MAKE OVER \$100,000 WRITING SOFTWARE

THIS BOOK WILL TELL YOU HOW I DID IT!

HOW TO MAKE OVER \$100,000

Last week I sold over \$6,000 worth of software. I am a one man software company. On the average I make over \$3,000 profit every week. In the past month, I have received at least \$500 in the mail every day. It took only 12 months for sales of my programs to reach \$25,000 per month, yielding over \$100,000 profit monthly.

You don't have to be a computer wizard to make over \$100,000 per year writing software. Every program I write is in IBM BASIC. The way to making money is writing programs that you or a publisher can market profitably.

I sell my software by direct response advertising. There are several advantages to selling your software through direct response advertising.

1. Total Control of the Marketing
You do not have to sell to distributors or retailers.
2. Low initial investment
You can try out an advertisement for a few hundred

WHAT THIS BOOK CAN OFFER YOU

You are getting information in this book that will enable you to make one thousand dollars or more every week. I had to learn the hard way. There are a few books describing the software business. Unfortunately, most of them are written by authors who have not been in the industry. I made a few mistakes that cost me thousands of dollars and months of work. This book can help you avoid making the same mistakes.

1. Dollars. One of my successful advertisements that now sells me over \$1,000 weekly started with a \$100 advertisement.
2. Reputability and Expandability
If you have an advertisement that earns you money the first time, you can repeat the advertisement every month and risk the rest of your magazines.
3. The ability to enter specialized software

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Other Hazards of the software business

HOW TO TELL WHICH PROGRAMS TO MARKET

About every other week someone brings me a program that they have spent months working on. Some of them are excellent programmers, who think that because they wrote a program better than the current best seller the world is going to best a path to their door.

If you are going to spend \$4,000 per month on advertising for a program you have to make more than \$4,000 in sales. It doesn't matter if your program is hand-coded in assembly language or if it is 4 times faster than the current best seller. If you cannot sell over \$4,000 worth of programs you are not going to make a dime. The same is true even if you spend only \$500 advertising each month, but make only \$500 in sales. The same thing is true even if you get a publisher to publish your program. If a publisher cannot make more from sales of your program then his cost, he is going to drop your program fast.

To determine what type of programs sell I went through every issue of PC and PC World for the past year. Software publishers regularly send the advertisements for profitable programs and distribute advertisements for unprofitable ones. Putting the successful ads in one group and the unsuccessful ones in another group I became convinced that the successful programs had several things in common. The unsuccessful programs had different things in common. While no software has a 100% chance of being successful, following my advice will at least give you a very good chance of being successful.

WHY AM I GIVING AWAY THE TRADE SECRETS

You might wonder why I am giving away secrets that would increase competition. Quite frankly, there are more opportunities out there than there are people willing to take them. Of the programs that sell over \$50,000 dollars worth of programs each year there is naturally a lot of competition to be the next Lotus or the next Ashton-Tate. Of the programs that sell in the \$10 to \$2 million dollar volume range there are fewer people writing programs for these markets. However, for programs that can only sell \$20,000 to \$100,000 each year there is a lack of people writing software for these small markets. To sell \$100,000 worth of software you only have to sell two thousand packages (less than six per day) at fifty dollars each or just one program a day at \$200 each. While only word processors, databases, and spreadsheets have the mass appeal to sell millions of copies, there are thousands of possible programs in specialized fields that can sell one copy a day. The opportunities in the specialty software field are so great that it does not make any sense to compete with someone who already has the market when you can find your own niche and have it all to yourself.

15 DAY MONEY BACK GUARANTEE

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WHY THIS BOOK IS FOR YOU

If you are interested in writing software you would be foolishly not to purchase my book. Do you want to waste years of making software programs that don't sell? If my book saves you from making one bad mistake, I should save you thousands of dollars. If my book enables you to market your programs, you could make over one million dollars over the next ten years. If you could make half as much money as I am, you would be earning \$1,500 every week. Do not delay in starting your own software company. Every week you wait is another week you are not earning \$1,500.

MONEY BACK GUARANTEE

If you are not 100% satisfied with this unique book for any reason, I will return it and your total purchase price will be refunded in full. If you are not happy, you should not have to pay for the book. That's the way we like to be treated. That's the way we treat others. If you can't get it in the book, it will be a crack in the ice without risking your money.

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MY OWN WORKSTATION



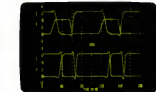
How many long unproductive hours have you spent "in line" for your simulation? Well, no more. MICROCAP and MICROLOGIC can put you on line by turning your PC into a productive and cost-effective engineering workstation.

Both of these sophisticated engineering tools provide you with quick and efficient solutions to your simulation problems. And here's how.

MICROCAP: Your Analog Solution

MICROCAP is an interactive analog circuit drawing and simulation system. It allows you to sketch a circuit diagram right on the CRT screen, then run an AC, DC, or Transient analysis. While providing you with libraries for defined models of bipolar and MOS devices, Opamps, transformers, diodes, and much more, MICROCAP also includes features not even found in SPICE.

MICROCAP II lets you be even more productive. As an advanced version, it employs sparse matrix techniques for faster simulation speed and larger net-

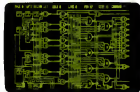


"Typical MICROCAP Transient Analysis"

works. In addition, you get even more advanced device models, worst case capabilities, temperature stepping, Fourier analysis, and macro capability.

MICROLOGIC: Your Digital Solution

MICROLOGIC provides you with a similar interactive drawing and analysis environment for digital work. Using standard PC hardware, you can create logic diagrams of up to 9 pages with each containing up to 200 gates. The system automatically creates the netlist required for a timing simulation and will handle networks of up to 1800 gates. It provides you with libraries for 36 user-defined basic gate types, 36 data channels of 256 bits each, 10 user-defined clock waveforms, and up to 50 macros in each network. MICROLOGIC produces high-resolution timing diagrams showing selected waveforms and associated delays, glitches, and spikes—just like the real thing.



"Typical MICROLOGIC Diagram"

Reviewers Love These Solutions

Regarding MICROCAP... "A highly recommended analog design program" (PC Tech Journal 3/84). "A valuable tool for circuit designers" (Personal Software Magazine 11/83).

Regarding MICROLOGIC... "An efficient design system that does what it is supposed to do at a reasonable price" (Byte 4/84).

MICROCAP and MICROLOGIC are available for the Apple II (64k), IBM PC (128k), and HP-150 computers and priced at \$475 and \$450 respectively. Demo versions are available for \$75.

MICROCAP II is available for the Macintosh, IBM PC (256k), and HP-150 systems and is priced at \$895. Demo versions are available for \$100.

Demo prices are credited to the purchase price of the actual system.

Now, to get on line, call or write today!

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Letters to PC

Are You My Father?

We were so excited to see *PC Magazine's* cover of the March 5, 1985, issue (*PC*, Volume 4 Number 5). Our mutt, Sparky, has been looking for his father for years, and to our surprise we found him on your cover! Could you tell us what breed or mix that dog is? We know Sparky's mother's background, but his father has been a mystery to us for years.

Barbara Sarapas
St. Paul, Minnesota



Jack the Wonder Dog is a smooth-haired fox terrier. Although we can't speak for his nocturnal activities, we are reasonably sure he's never been to Minnesota.—Ed.

Fundamental Features

I was pleased to see the review of Professional BASIC in *PC* ("Morgan Computing's BASIC Differences," *PC* Volume 4 Number 5, page 42), although the principal feature of the product was not even mentioned.

The fundamental idea behind the product is its elaborate tracing system, which lets you see an executing program—the values of all variables, the current file

buffer contents for all open files, the status and nesting of FOR/NEXT or WHILE/WEND loops, the nesting level of GOSUBS, and the exact position in the program. All of this activity can be viewed while the program is running, paused, or in the single-step mode.

It's unfortunate that Woram had only the minimum amount of memory. With 512K or 640K a user can write programs that can access all the available memory on the machine. This ability may be useful to an engineer or scientist who wants to create a large array, such as 200 × 200, which contains 40,000 elements. Since each single-precision number uses 4 bytes of memory, such an array takes up 160,000 bytes of memory.

Chris H. Morgan
Morgan Computing Co.
Dallas, Texas

I thought that the product review of Morgan Computing's Professional BASIC was incomplete. John Woram mentioned two windows, a Command window and a Print window, but he didn't mention any of the following windows: List Trace, Back Up, Time Trace, Array, Two Dimensional Single Precision Array, For/Next, GOSUB, Data, I/O Buffer, and Variable.

Professional BASIC has more windows than the ones I've listed, but it is these windows that make it such an amazing product. The windows let you look straight into the guts of a BASIC program and actually see what is happening as it is happening. You can run a program in single-step mode so that each time you press the spacebar one instruction is executed. You can be in this mode and split the screen into two windows—the left half of the screen will show the instructions that are being executed and the right half of the screen will show the variables on which the instructions are working. When you hit the spacebar and see the variables change,

the result on screen is absolutely flabbergasting.

On one occasion, I was writing a program that read and processed a file, but for some reason things just weren't working. I was able to look into the I/O Buffer window before a record was read, then in single-step mode I got to the point where the record was being read, and I looked at the variable. I found the trouble so quickly that it was like shooting fish in a barrel.

To conclude the article by saying that you should try the product if you have lots of memory and an 8087 is unfair. I would say buy as much memory as is necessary to support this product and Professional BASIC will cut your program development time significantly.

Milan Illich
Oak Park, Illinois

A Moral Right to Software Copies?

The Norton Chronicles usually contain some of the most useful information in *PC*, but "A Serious Lap Computer at Last" (*PC*, Volume 4 Number 2) indicates that Norton could use a rest.

The first part of the article discusses the glories of the DATA GENERAL/One, the portable with an admittedly poor screen. The second part of the article jumps to the moral right of users to their purchased software. Norton implies that when an end user purchases a new computer, any software publisher from whom he bought software should provide a free copy of such software formatted for his new machine.

Such reasoning coming from a software developer is surprising. Norton surely recognizes the time-consuming efforts that software developers make to port their existing software to new machines. What incentive would there be to put forth such an effort were it not for another sale?

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Letters to PC

Half-Way Connection

Werner Grunbaum's article, "Legal Connections," (*PC*, Volume 4 Number 4) suggests that using modems to transfer files between PCs in a legal office would be a good alternative to LANs. I see a problem in doing this because one user would have to interrupt another's work to send a file to him.

A better solution is to send the file by modem to a local remote computer service (RCS) company and let the other worker retrieve it at his convenience. This is an efficient medium for transferring files and messages between firms. A typical RCS or time-sharing service is able to support a variety of equipment and therefore can function as a versatile LAN with the advantage of being able to send messages and documents to receivers outside of the office.

James A. Mayer
Morrison, Colorado

Bulletin Board Search

I am interested in getting a list of bulletin board systems. Can *PC* offer any suggestions on how to get such a list?

David L. Salahi
Irvine, California

An on-line directory of bulletin boards is maintained by *Public Access Message Systems (PAMS)*. It's available on *CompuServe (MAUG XA4)* and *The Source (PUBLIC 112)*. Also, a sample issue of *Plumb*, a printed newsletter covering bulletin boards, is available for \$2 from *Plumb, P.O. Box 300, Harrods Creek, KY 40027*. *PC Magazine* will be publishing a comprehensive list of bulletin boards in the next issue.—Ed.

Tax Preparation Software

David Thraikill's review of *Your Income Tax* by the J. K. Lasser Institute is pretty accurate ("Software for 'Your Income Tax,'" *PC*, Volume 4 Number 7). The program is slow, the help function is

virtually useless, and the calculator is not as good as the one in Borland's *Sidekick*. But a few of his points warrant comment.

Concerning a capital loss on Schedule D, I think Thraikill fell victim to a circularity in the tax form itself (blame the IRS). Before entering a final value on Schedule D for a capital loss, the taxpayer

has used a financial or budgeting program to organize his year-long data, the task may be easier. Otherwise, it's a struggle with or without these programs.

The real value comes later. An experienced taxpayer never signs and mails in his first calculations. In a few days, he'll remember new items or he'll learn something new that he'll want to incorporate. When these changes are made, these tax preparation programs can ensure that all the effects of the changes are considered and calculated.

Howard W. Kreiner
Bethesda, Maryland



er must know his taxable income. This is partially determined by the size of the capital loss. So the program will not compute a final value for Schedule D until all the rest of the Form 1040 inputs are entered and calculated to obtain a tentative taxable income value. Once this is completed, the status line will say that the Form 1040 is complete, and the Schedule D calculation can be completed and automatically entered on Form 1040 to give the revised taxable income. The documentation does not mention this point.

As to whether this program or any of the other tax programs reviewed in that issue really make tax preparation easier or more efficient, I think the answer is the same for all of them. The real work of the tax calculation is assembling, collating, and interpreting the input data. If the

No Laughing Matter

Thank you very much for "Kennedy's Corner" in *PC News (PC, Volume 4 Number 7, page 69)*. It was the funniest part of that issue.

PC readers would probably enjoy Kennedy's wit if it were aimed at the software developers who have espoused copy protection and have threatened damage to machines running unauthorized copies. They are greedily protecting huge profit margins that will soon disappear as competition lowers the price of software to a reasonable multiple of its cost of duplication—just like books.

I wonder if Lotus or Ashton-Tate employees ever make photocopies of magazine articles and ads? Magazines are copyrighted too.

Keep up the good work.

Alexander V. Pinter
Columbus, Georgia

It is difficult to find words to express my appreciation and approval of Don Kennedy's reasoned and sane opinion expressed in "Kennedy's Corner." So many others would do well to emulate his exemplary tone. This is very productive work indeed.

James Pettit
Austin, Texas

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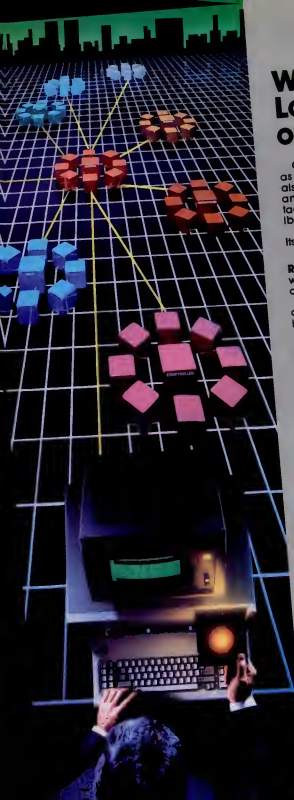
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Congratulations on getting the bulletin board up and running. I am looking forward to being able to download the article index. If users are able to search for articles by key word, it will be very useful. A mailbox for messages to and from your staff would be nice also. Hope to see the bulletin board growing.

Charles Petzold
New York, New York

The bulletin board system looks really useful. I am curious as to what benefit the expert mode has. Other than that, everything is quite clear and simple to use. Thanks for your work.

Tom Martin
Brick, New Jersey

The User-to-User and Spreadsheet Clinic sections of *PC* are among the best parts of your magazine. I would be very interested in seeing programs from these sections available on this bulletin board.

Wes Jones
Wilmington, Delaware

I just wanted to let you know that I think this IRS is a great idea! I have never liked the idea of keying line after line of someone else's program.

Niel Wiegand
Austin, Texas

I really enjoy *PC* and look forward to reading it and browsing through the articles and advertisements. This IRS is a great way to get instant feedback from your readers. The Spreadsheet Clinic is a good start on a theme that can obviously be expanded to other areas. Sections in the magazine like this illustrate the growth of expertise *PC* users are experiencing. However, please continue to cater to both experienced and novice users. People can be knowledgeable in one area and not in others.

Jeff Kurpaska
New York, New York

This is my first time on *PC*'s Interactive Reader Service, and I think you have a great thing going. This shows me that *PC Magazine* is dedicated to its subscribers, and I for one will definitely be renewing my subscription. The magazine is good,

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ers. It is remarkably well written and laid
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business, I am aware of the immense
pressure on all of you. My hat goes off to
your entire staff for the excellent job you
are doing.

Gary Gruber
Rancho Mirage, California

I just want to add my vote to the voices
that have received this service positively.

David Welcher
Brooklyn, New York

Correction:

Expert-Ease, an expert system reviewed
in Volume 4 Number 8 ("Expert-Ease
Makes Its Own Rules") is available from
a third distribution outlet in addition to
the two that were listed. It can be ob-
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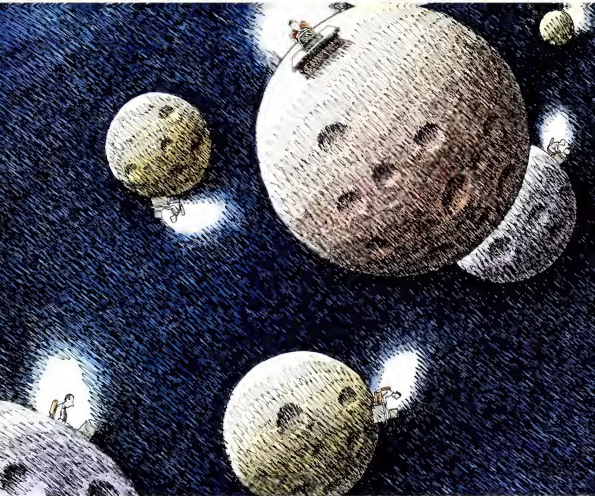


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Waiting for Good Print

The introduction of IBM's new printers, the Wheelprinter and Quietwriter Printer, seems to mark its entrance into the letter quality market. Norton takes a good look at the very flexible Quietwriter.

I suppose we're all looking for the perfect printer. If that seems like a pretentious, metaphysical statement, well, what can I say? I'm still looking for the perfect printer for my PC, and I've yet to find it. To heck with perfect; just satisfactory is hard enough to find.

As always, I'm a fan of IBM, and I was very interested when, some months ago, it announced a couple of decent-looking printers. Before this, all that IBM had offered for PC printers was a series of practical but crappy dot matrix printers. While the best letter quality printers there are—the NEC Spinwriters—got a sort of official seal of PC approval from IBM, that wasn't really enough. IBM's a class act, and it needed something better.

The New Printers

Enter IBM's dreadfully named Wheelprinter and Quietwriter Printer, two very interesting new printers for the PC family. I loved them on sight and immediately treated myself to a Quietwriter. There is a lot that I like about the Quietwriter, and this column should be taken as an extended sales pitch for it—I think you probably ought to get one. Even though I think you ought to get one, the main thing I'm going to talk about is the disturbingly long list of things I don't like about the Quietwriter. I'm going to tell you about what's wrong with it, so that when you get around to buying one you won't be disappointed with its flaws (as I was).

Despite the fact that IBM developed

several printer technologies, including the venerable Selectric golfball and the ink jet printer, the company has been hurting in recent years for anything up-to-date in either typewriters or small computer printers. It obviously noticed



Peter Norton

that fact and attempted to come up with a coordinated solution. Out came a series of three typewriters and two computer printers based on two different print engines. One engine is a conventional daisywheel, which is the basis for two of the typewriters and the Wheelprinter. The other engine is a technical innovation that in effect marries a thermal printer to a letter quality carbon ribbon. It produces remarkable print quality and is the basis for the third typewriter and the Quietwriter Printer.

The Quietwriter print mechanism basically melts a film ribbon of ink onto paper, noiselessly. Its print images are gen-

erated electronically, essentially as a super-high-resolution dot matrix impression (you can't see the dots). The result is that the Quietwriter can print the full PC font.

Paper-Handling Problems

While it's pretty terrific, there are some problems. One of them is that the Quietwriter and its Wheelprinter brother don't share the same paper-handling design. While the Quietwriter has the nifty printing mechanism, it's the Wheelprinter that has the slickest paper handling. In one tidy, compact, and elegant design, it handles single sheets, cut-sheet feeding, and continuous pin-feed paper.

The Quietwriter Printer, on the other hand, uses a large, clunky separate tractor mechanism to pin-feed paper. It plugs into the printer electronically—which makes taking it on or off more of a chore and changes the behavior of the printer in some annoying ways. People think that they can get along without using a tractor to feed continuous forms into their printers, relying instead on the rubber platen to run the continuous paper through without its getting out of alignment. That works on lots of printers, but the Quietwriter doesn't have a platen that's precise enough to work that way. With the Quietwriter Printer, you need the tractor, clunky or not.

The Quietwriter seems to print both quickly and quietly, but there is some disappointment here, too. Because of the fancy thermal/carbon printing process, it can only print left to right—not back and

forth the way most modern printers can — so all those nonprinting carriage returns slow down the printing speed.

The print speed is again compromised by the Quietwriter's ribbon-conservation

techniques. If it's passing over more than two spaces, the ribbon and print mechanism are lifted off the paper. This process makes a soothing but distinct noise, and it also considerably slows down the

printing. Not only does the print mechanism stop dead when the ribbon is moved on or off the paper, but it actually backs up slightly. All that motion slows things down. When I first test-drove the Quiet-

Print speed is compromised by the Quietwriter's ribbon-conservation techniques.

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writer, it looked good printing out a paragraph of continuous text. But with anything discontinuous—like a column of figures, such as accounting or spreadsheet data—this beast really slows down. This can be a problem even with text—if you're having your word processor justify the text, it ends up with triple-spacing between words.

I quickly found out why the Quietwriter Printer works so hard to conserve its ribbon, though. It goes through them pretty fast, and, at about \$12 a pop, it isn't particularly cheap. Since this is a new printer technology, the ribbons are only made by IBM—but even when competing sources appear, the price isn't likely to be much less thanks to the high-tech elements embedded in the ribbon design. When was the last time you spent \$12 for a typewriter ribbon?

Font Cartridges

However, the biggest thrill and the biggest heartbreak come together in one special feature of the Quietwriter: its electronic font cartridges. There are four PC fonts available, plus numerous typewriter fonts, for \$50 each. Again, IBM is the sole source for these cartridges.

The four special PC fonts have the full 250-odd extended ASCII characters that your PC uses, so that you can print anything on the screen, including the box-drawing and other graphics characters, the card suits, and the happy faces. It's great to have a letter quality printer that can print all the PC characters. What's more exciting is that the Quietwriter can hold two font cartridges, so you can switch between them with a few simple printer control codes.

Now comes the heartbreak. Among

Complementary Comments

The option of using non-IBM hard disks in the AT has several advantages, and the Enhanced Color Display in tandem with IBM's Enhanced Graphics Adapter gives you readable color.

Three issues back, I devoted this column to two new PC add-on boards—IBM's Enhanced Graphics Adapter, or EGA, and AST's Advantage multifunction board for the AT ("Across-the-Board Surprises," PC, Volume 4 Number 7). I've got some entirely different things to talk about this time, but you'll find that the conclusions I draw make this column a sequel to that previous board analysis.

From the beginning, you've been able to add hard disks to your PC. However, not everyone knows that. When the design of the AT was unveiled, there was a great leap forward in the PC family's ability to accommodate hard disks.

Hard Disk Flexibility

It wasn't just that the AT came with a hard disk much bigger (20MB) and much faster than its IBM predecessors; the design of the AT included support for over a dozen different sizes of hard disks—some of them conventional, some quite weird.

As the AT was designed, any disk that followed the basic specs (for electrical connections, and so on) and matched the characteristics of one of the predefined AT hard disks could be plugged right into the system and used without any special software—no device driver and no special CONFIG.SYS setup.

This design feature of the AT has opened up some very interesting doors. For one thing, it makes it noticeably easier for PC users to install non-IBM hard disks in their ATs.

This, frankly, is wonderful.

There are three benefits to this situation. The first one is that if IBM's 20-MB AT disk isn't big enough for you, you can easily get a bigger one, without making your AT "foreign." The second benefit is that, if you don't like IBM's



Peter Norton

prices, you can get a standard-size 20-MB drive for an AT from somebody else and save some money. The third benefit here is simply availability. If you can't get an AT with a hard disk because IBM is short on them, you can get a stripped-down AT and purchase the hard disk separately.

Non-IBM Advantage

In the column "Across-the-Board Surprises," I pointed out that the flexibility and design of AST's Advantage board allows you to equip a stripped-down AT with all the serial ports and parallel ports that you might want plus all

the memory you want—all on one board. It isn't just that the AST board is cheaper and simpler than using a bunch of IBM boards; the AST board also lets you have, in effect, more memory. With the Advantage, you can have 640K (not 512K) of regular memory plus the AT's special extended high memory; with IBM's boards, it's one or the other, but not both.

Getting non-IBM hard disks for an AT fits in nicely with the strategy of using AST's Advantage board. You save money, you enjoy the option of getting more than IBM will provide, and you may even get your system sooner.

To investigate this strategy, I've been looking into add-on hard disks for the AT. The first supplier I found was Interface Incorporated, 21101 Osborne St., Canoga Park, California 91304 (818) 341-7914. By the time you read this, there are sure to be other suppliers.

The Interface Disks

Interface supplies five sizes of AT hard disks. Two match the AT's predefined types: a 20-MB disk that exactly matches the standard AT disk and a 32-MB model that hits the now-standard DOS disk-size limit. The other three require software device drivers: a 10-MB disk with removable cartridges and two fixed jumbos—a 52-MB and a 110-MB drive. I got loaners of three sample sizes, the 32-MB model that I'll be discussing now and the cartridge 10-MB and fixed 52-MB disk, which I'll cover in a later issue.

The 32-MB disk seems by far the best one to consider; first, because it's a sample

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In practice, a drive this large performs much more slowly than a smaller one simply because of the extra system overhead (a larger file allocation table and so forth). In some of my tests, the 32-MB drive took more than four times as long to get disk work done, even after I had adjusted the DOS disk buffers in its favor. That's a natural characteristic of bigger disks.

Display Enhancements

What I want to talk about now is the other part of the semisequel to my board review column. If the natural complement to the AST Advantage board is a non-IBM hard disk, the natural complement to an IBM Enhanced Graphics Adapter (EGA) is the new IBM Enhanced Color Display (ECD).

The enhanced display is a big improvement over IBM's old color display and its competitors. The ECD has a clearer, sharper image that looks good when it's hooked up to a regular color/graphics adapter but looks even better connected to the EGA. The EGA really makes this new display sing.

The EGA also takes special software, which was part of why I wasn't at all excited about it when I discussed it previously. The EGA and the EGA/ECD combo has great potential, but most software won't be able to take advantage of it for some time.

However, at least one piece of software is taking advantage of the EGA/ECD combo—Microsoft's *Word*, Version 2. I had a brief taste of a prerelease version, and I must say that what *Word* can do with the ECD is dazzling: italics in full color, for instance. On the other hand, the eyestrain and fatigue you can experience looking at this stuff is another matter.

Good Recommendations

Editor Bill Machrone and executive editor Paul Somerson—who got their hands on an ECD long before I did—swore to me that its performance was so good that you could work in front of it all day without eyestrain, unlike regular color monitors. In my judgment, they are only $\frac{1}{2}$ right. I've found the ECD's regular characters, in the regular

white on black, are as easy to work with as my old favorite, the IBM monochrome monitor. But in two other basic situations—working in true color and working in black and white with special

characters à la *Framework*—I still have problems. The ECD may be a very big ergonomic improvement over the old color displays, but you're probably still better off in monochrome. ■

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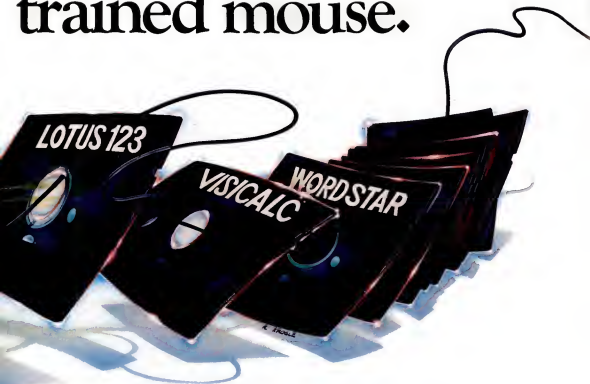
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Sooner or later, you'll have to face this computer problem.

PC MAGAZINE • MAY 15, 1984

Do your eyes itch, burn, or tear? Are they tired and sore? Do you get headaches, occasional dizziness, or blurred or double vision? If you have any of these symptoms, you're probably suffering from eyestrain and fatigue, and it may be from using your PC.

Eye fatigue and other vision problems are common for regular users of PCs and other kinds of video computer displays. This visual stress can also contribute to general tension and tiredness. Fortunately, vision problems experienced by video display users have

Better sooner.

Better Sooner.

Computers don't ever get headaches.

But the people who use computers do.

Quite clearly, as PC Magazine spells out, that's not the only trouble they're having.

In case you're tempted to dismiss this as trivial, there are two things you should be aware of:

First, more than twenty states are already preparing legislation to force some improvements.

Second, if computer users suffer, so does business.

Because computers are only as fast and accurate as the people who operate them.

You are not a machine.

Computers are designed by engineers.

They usually know a lot about technology but very little about people.

Which is why so many computers are technically impressive but strangely unnatural to use.

Computer-induced problems (%)

Eye strain	55%
Back pain	43%
Headaches	30%
Shoulder	25%
Hand/wrist	18%
Neck pain	15%

(Source: "Ergonomic Principles in Office Automation" Pub. 1983 by E.I.S. AB, Sweden.)

Ericsson, in its very Swedish way, has always believed that excellent ergonomic design isn't a privilege.

It's a right.

That it isn't a noble gesture but demonstrably good for business.

It's an attitude that has made Ericsson No. 1 in Europe twice over: First, as the giant of European telecommunications.

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Here is one example of how they got there.

It's the first of a whole range of computers to be introduced in the U.S.A.

The Ericsson PC. It's Ergo-Intelligent.™

Ericsson has spent \$300 million finding ways to make people and computers work better together.

Here are some of the results.

Ergo-Screen.™

Aspirin gets rid of a headache. Ergonomics gets rid of the cause.

The Ericsson PC monitor has a non-glare screen.

With restful amber characters on a specially developed, low-fatigue background color.

Even the shape of the actual characters was specially developed to allow easier recognition of difficult to distinguish letters like O and Q.

On the monochrome monitor, the resolution is double that of IBM's, so clarity is remarkable.

You can even have characters and graphics on the same screen.

Ergo-Arm.™



Thousands of people get neck and muscle pain from inadequate height and angle adjustment.

The Ericsson Ergo-Arm lets you move your screen exactly where you want it.

Better than back pain, wouldn't you agree?

Ergo-Touch.™

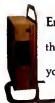
The keys are full-size and the layout is ergonomically planned for greater accuracy and speed.

Yet the keyboard is 20% more compact and less than half the weight of IBM's.

Even the cord is adjustable to suit left- or right-handers.

Ergo-Color.™

Even the color of the case is ergonomically selected to be restful to the eye over many hours.



Ergo-Space.™

The system unit is one-third smaller than IBM's.

It even fits under your desk in a vertical rack.

So your desktop is your own again.

IBM Compatible.

Many companies claim to be compatible.

Some are. Some are stretching the truth.

The Ericsson PC boasts the highest compatibility rating there is.

It's operationally compatible.

You can take advantage of thousands of PC-compatible programs already available.

In fact, with the best-selling software, the program and data disks are interchangeable with those of the IBM PC.

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3 Free Offers.

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And arrange a hands-on test if you ask for it.

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ERICSSON 

system. Some of the most dramatic and cost-effective productivity boosters that you can add to your PC slide comfortably into a pair of often-overlooked expansion areas: the two disk drive slots in the front panel.

With a hard disk in a PC drive slot, many programs race at ten times their floppy disk-based speeds. You can cut the time you spend loading and unloading floppies by adding in extra half-height disk drives. You can save storage costs by switching to higher-density floppy drives. You can feel secure with streaming tape backups of your data and files. You can tiptoe into the 21st century with a laser-based mass storage system.

Of course, the set of "official" internal expansion slots makes your PC more useful when you slide in circuit cards for attaching printers, communicating through the use of a modem or a network, and seeing what you're computing with a display adapter. But expansion slots by themselves can't give you the increases in speed and data security that you can obtain with hard disk drives and backup systems; you end up snaking some ill-mannered cable from your system unit to a noisy expansion box that takes up desk space.

Yet, when you add power to your disk drive slots, you eliminate the clutter and clatter of add-on accessories. And, by adding in peripherals rather than adding on subsystems and extra chassis through your expansion slots, you can substantially cut your expansion expense.

The Big Blue Blessing

As with any too-good-to-be-true offer, plug-ins, or add-ins, have their share of shortcomings. Fortunately, technical advances have wiped away two of them—availability and acceptability. Most of

today's add-ins weren't available a few years ago, and even when they were, IBM users scorned them because they lacked Big Blue's blessing. But all that has changed.

When the PC was first introduced, drive slots weren't used for anything but floppy disk drives. But, the release of the XT stamped PC Winchester with IBM's approval. IBM's attitude toward half-height floppy disk drives was originally disdainful because their specifications were at odds with the requirements of PC DOS. But with the introduction of the PCjr and the revision of DOS to Version 2.1, half-height drives also joined the IBM fold. (Incidentally, the DOS update primarily focused on making the operating system compatible with slower-responding half-height floppy disks.)

Then the AT brought acceptance of quad-density floppies. Today, PC users are betting on when IBM will wake up and offer a reasonable backup system.

Some add-ins still suffer from other shortcomings. For instance, older hard disks and many modern high-capacity models are power hungry, and the PC's meager 63.5 watts cannot run them. Before you add in, check how many joules your favorite gem requires.

Of course, you'll have to free up one of the two drive slots in your PC before you can consider add-ins. You'll have to give up something. You don't have to worry about waste, though, because any drive you pull out and file away on the shelf becomes a perfect spare—and disk drives are the most failure-prone part of the entire PC system.

In this issue, PC explores all the add-in products currently—or soon to become—available, especially those offering the most power and versatility for the smallest

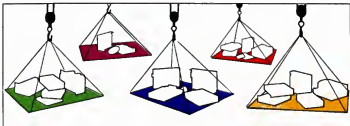
investment. The reviewers pull some of the most interesting products off the shelf, plug them in, and put them through their paces; they test each product to see if it measures up to the vendor's claims and determine whether you need to be a mechanic or masochist to install it. They also offer advice on which products are best for you and how the add-ins can help you get more out of your PC.

Add-In Speed

Adding in a hard disk drive to your PC cuts the agonizing delays when big, powerful programs, such as *1-2-3*, load, when such useful-but-not-too-bright programs as *dBASE II* sort through the contents of a whole disk, and when primitive but endearing programs similar to *WordStar* waste a noticeable fraction of your life loading overlay files. (Although the coprocessor boards you can slide into an expansion slot make your computer think faster, most of the waiting you do is a product of lackadaisical floppy disk access speeds rather than the retarded thought processors of the PC's native 8088 brain.) Big hard disks also eliminate the frustration you endure every time you have to switch floppy disks to change programs or waste through acres of data.

The problem with adding on the high speed and memory of hard disks has been their big price. For an add-on hard disk, plan on spending about \$2,000 or more.

You don't have to have an MBA to calculate that only part of your cash outlay for an add-on hard disk goes for the disk itself. You're also buying a cabinet, a fan, a power supply, 5 to 10 feet of cable, a controller, an adapter card to slide into your PC, and instructions. When you add in instead, you pay for only what you need—the hard disk and its controller.



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- ◆ New Technology, page 144

Moreover, the new add-in minimalism has created a new form of marketing with one less tier. Instead of putting a new label on a cabinet stuffed with someone else's disk drive and then selling the finished creation to a dealer, the disk drive manufacturers themselves sell their wares directly to mail-order merchants, who need to toss only a controller and some minimal instructions into the same box and sell the whole set directly to you. Better still—for you, at least—competitive pricing has hacked mail-order add-in Winchester prices down to last year's price for floppy disk drives.

Add-In Security

A new hard disk brings worries along with it. All your data and files are sealed away where you can't see or touch them. Worse, you can't protect your precious information by locking it away in a disaster-proof location. A bolt of lightning or a bulge in your power line could wipe away all your records.

Of course, you could connect up a tape backup system through an expansion slot, but add-on backup systems limp under the same handicaps as add-on hard disk drives: you have to support the product you want in a manner to which it is accustomed, with its own expansive home and a diet of the purest DC.

It's little wonder, then, that a growing number of manufacturers are now tuning the PC's disk drive slots into safe havens for backup devices—not just streaming tape but removable-cartridge hard disks and high-capacity floppy disks too. Any one of this thrilling threesome gives you data duplicates that you can lock up in case lightning blows your data away. Moreover, the last two can do double duty as your primary storage system by day and as backup machines just before you shut down operations in the evening.

Nearly all the newer add-in devices take only half a drive slot and are compatible with most of the others. Overall, you have four places that you can fill with dozens of different devices. After mulling over your choices, you can mix and match to your heart's content. The possibilities and power with which you can fill your PC are limited only by your budget—and your imagination. ■

TEST DRIVING THE HARD DISKS

To see how removable cartridges measured up against regular hard disks, both were subjected to our benchmark tests.

We subjected both the regular and removable-cartridge hard disks reviewed in this issue to a three-phase benchmark procedure. All three were time comparison tests, and their results appear in the charts that accompany some of the reviews in the following pages. We performed multiple trials with each product, but when the duration of any of the tests was excessive, only one trial was recorded.

Three Tests

The first test involved formatting the disk or cartridge. When the drive required both physical and logical formatting, the times were recorded for each step. What we were actually measuring was convenience. The impatience we all feel while formatting a 360K floppy is minimal compared to what we may feel waiting to format an entire hard disk.

The second test measured the read/write ability of the drives in four different environments. The benchmark program, written in Interpreted BASIC and then compiled using the IBM BASIC Compiler, performed three major tasks: sequential write, random read, and sequential read. To avoid confusing the disk activity with the timing of the program, the only functions we timed were

PUT and GET (see Figure 1).

The reviewers recorded the times it took to create a 200K data file using record lengths of 128 bytes, 300 bytes, 512 bytes, and 578 bytes. DOS handled the 128- and 512-byte records easily, but the odd 300- and 578-byte record sizes, which overlapped the sector barriers, resulted in longer times. After the file was created, the program performed a random read of 256 records, followed by a sequential read of 256 records. The purpose of the random read was to force the drive head to search for the next record nonsequentially. This search causes the mechanism that supports the read/write head to move erratically. Sequential reading on a newly formatted disk is a fairly simple task for the drive to handle because the records are "stacked" one in front of the other, which minimizes the motion inherent in a random read.

The third test timed a simple program load. *WordStar* was selected because the reviewers were familiar with it. The timing of the program started when the Return key was hit and ended at the first sign of the copyright message. This test measured the time required to integrate the loading of a program with the merging of the overlays that supported it.

—Michael O'Conne

```

730 '
740 ' THE TIMING IS DETERMINED BY ACCESSING THE SYSTEM CLOCK LOCATED AT
750 ' BYTES 6C-6F (HEX) AT OFFSET 040 (HEX). THE VALUE IS THEN DIVIDED BY
760 ' THE AMOUNT OF TICKS PER SECOND, (1193180/65536)
770 '
780 C1=PEEK(8H6C) :C2=PEEK(8H6D) :C3=PEEK(8H6E) :C4=PEEK(8H6F)
790 PUT #1,REC
800 D1=PEEK(8H6C) :D2=PEEK(8H6D) :D3=PEEK(8H6E) :D4=PEEK(8H6F)
810 C5=C1*(256^0)+C2*(256^1)+C3*(256^2)+C4*(256^3)
820 D5=D1*(256^0)+D2*(256^1)+D3*(256^2)+D4*(256^3)
830 TICKS=D5-C5
840 TIME=TIME+TICKS/(1193180/65536)

```

Figure 1: This block of code, a portion of the benchmark program for the second test, exemplifies the timing method used to test the hard disk drives reviewed in this issue.



FACE OFF

One blustery Friday afternoon last February, 29 M.B.A. candidates from the University of Pennsylvania's Wharton School boarded cars, buses, or trains and headed for a weekend in New York City. All but a few had left their studies behind, and they spent most of the 2-hour trip thinking about favorite New York restaurants and night spots. Most looked forward to a fun weekend in the city; few were prepared for the grueling, 36-hour work marathon that lay ahead. The students had agreed to participate in an unusual event sponsored by *PC Magazine*, the Spreadsheet Face-off, in exchange for room and board at the Inter-Continental Hotel. Teams of

Pulling an all-nighter.



arise if you are already taxing your electrical system. If you are unable to expand your electrical system or eliminate extra equipment, you can buy time by turning off other heavy power users (such as printers) when you boot up your disk in the morning.

Unfortunately, we could not test reliability over a long period of intense use, which can be the single most important factor in your satisfaction with a hard disk.

Internal hard disks are easy to accommodate in the office. They neatly install into the body of the PC and don't take up extra space on your desk, shelf, or floor.

When working with computers, nothing is more devastating than to lose valuable files through a disk crash or an inexplicable "bad sector" message. You'll learn the hard way if you don't heed this advice: back up, back up, back up!

Becoming a seasoned PC user inevitably involves, at one time or another, becoming a "megastorage" user. Internal hard disks are a valuable method for increasing the storage capacity of your PC. The added power and convenience is well worth the investment.

—Diane Burns and S. Venit

MOUNTAIN COMPUTER XT INTERNAL

Mountain Computer's 10-megabyte internal hard disk is a viable solution to your PC's storage problems. While the cost per byte of storage is somewhat higher than that of other disks that are reviewed here, the drive's easy installation and reliable

performance make it a worthwhile system to invest in.

Installation of the unit is quite simple and straightforward. You have to install the disk controller in an expansion slot and mount the disk drive into the PC. A faceplate is attached to the disk drive itself, so there are no extra panels to be put in place. The controller board has no switches to flip, and only three cables, including one for the power supply, are necessary to connect the drive. We were able to install the unit in a matter of minutes. However, we did find some errors in the slick, IBM-type documentation. The manual referred to grounding wires that didn't exist, and one of the files that were mentioned did not come on the disk supplied.

The manufacturer supplies the user with two software programs with which to format the disk. LOWFORM.EXE performs the physical format procedures, and MFORMAT.EXE, a modified version of the DOS program FORMAT.COM, does the logical format. The disk was formatted and ready for use within approximately 5 minutes.

Once installed and formatted, the disk worked beautifully, though somewhat noisily. The disk is fast, too—it loaded a 48K *SuperCalc* spreadsheet file in just under 15 seconds; most disks took 16 seconds or more. *WordStar* was loaded in just under 1 second.

Mountain Computer boasts that its drive is 100 percent PC-compatible, and to your PC it looks like it's been taken right off the shelf from Big Blue. The performance is reliable; this unit is a good investment, though it is not the least-expensive system that you can buy at the present time. You can definitely install the disk yourself and can figure in the savings from not having to rely on a computer store technician to get the disk up and running.

There was no reason for us to call the company for help, but when we did call to get some technical information, we found its representatives quite helpful and knowledgeable. With less and less service available to users at the retail level, it's important to know that a company stands fully behind the products it sells.

—D.B. and S.V.

2

MICRO DESIGN IS 10

Once you get it installed, Micro Design's IS 10 works like a 10-megabyte charm, albeit a somewhat noisy charm. But getting to that state of grace takes a long time. Count on about an hour to install the hardware and another hour to format the disk and perform diagnostic tests.

The manual includes fairly clear instructions, but unfortunately it is cluttered up with some old information that can be confusing. A section that tells you how to install a ROM chip on your system board actually applies to some of the company's older products. Some of the software information is also outdated. Doug Caldes, president of Micro Design International, said that a new manual is in the works, so that problem should soon be alleviated.

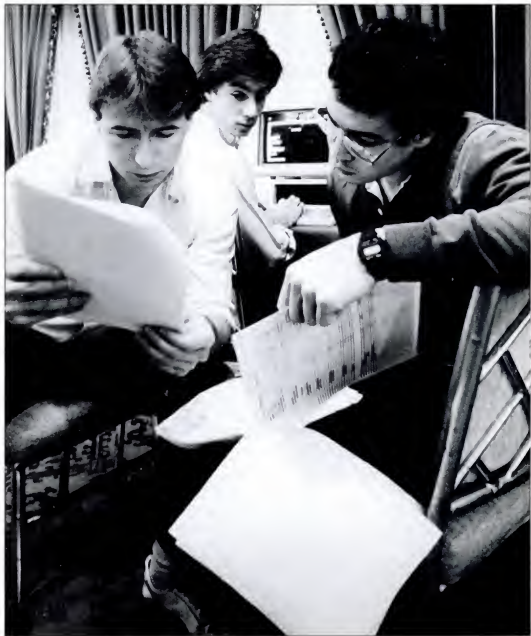
The hardware installation is straightforward. You are required to plug in a controller card, remove your right-hand floppy disk drive (if you have one), snake the connecting cables in behind your left-hand floppy drive, and plug them in. You finish up by screwing the unit into the mounting brackets.

Once the hardware is in place, you can put your disassembled PC back together and turn on the power. Now you'll encounter the loud background hum that accompanies the drive's operation. If the noise from the PC's fan bothers you, don't get IS 10: it makes the PC's fan seem practical.



- ◆ Quadram QuadDisk, 12 megabyte
- ◆ Sigma Designs HHK-02000
- ◆ Kermann Labs Megaflight
- ◆ Micro Design IS 30
- ◆ Quadram QuadDisk, 72 megabyte

To solve Problem 1, each team appointed one person to the keyboard, another to read data aloud, and a third to check the manual.



PLUG-IN HARD DISKS

tically silent. As you begin to use the drive, you'll also hear the funny squeak that IS 10 makes whenever it reads or writes. It's not as loud as the grinding you get with a Tandon floppy disk drive, but it's still noticeable.

Software installation is a straightforward procedure but it is also time-consuming. You simply follow the step-by-step instructions in the manual, use IS 10's menu-driven utility program to format the disk, and perform about 40 minutes worth of diagnostic tests. After that, you still are required to go through several more steps for the logical formatting of the disk. You use the DOS utility FDISK to create partitions on the disk for whatever operating systems you decide that you want to use. Then you have to modify a copy of the DOS FORMAT utility through the use of an IS 10 program, FMTFIX. This program allows FORMAT to work on IS 10 without clobbering the disk's record of any bad sectors discovered by the diagnostic routines.

Now you're almost home free. You just need to run the DOS SYS command to transfer the operating system to IS 10 and copy COMMAND.COM to the hard disk. Now the drive is ready for use and will perform just like the XT hard disk if you have a PC with a 256K system board.

If you have an early model PC with a 64K board, you have to get hold of a ROM upgrade kit if you want to power up your system without keeping a DOS disk in your A: drive. Otherwise, you can use a DOS floppy disk containing a CONFIG.SYS file, which will load the device driver for IS 10.

IS 10 comes with some handy utility programs that can make your life easier. A cache program lets you designate part of the PC's RAM for storing the most recently read hard disk data. For instance, if you devoted 128K to the cache and ran *WorldStar*, the program would run at RAMdisk speeds, roughly twice the speed you get with IS 10 alone.

Another nice program is *Command Assist*, which gives you a menu-driven PC-DOS, together with explanations of DOS commands. You can install *Command Assist* on IS 10 in about 5 minutes, and, once you do, you may never have to look up a DOS command in the manual

FORMAT TIMES

(in seconds) PLUG-IN HARD DISKS	PHYSICAL FORMAT	LOGICAL FORMAT
Micro Design IS10	92.00	97.00
Micro Design IS30	449.00	136.67
Quadram QuadDisk 12 Megabyte	140.20	0.00
Quadram QuadDisk 72 Megabyte	736.36	0.00
Everex Everdisk 10 Megabyte	131.83	0.00
Everex Everdisk 20 Megabyte	240.59	0.00
Kamermen Labs Megalight MF300	976.30	0.00
Falcon Tech PC eXTender	110.06	0.00
MnM Comp XT Internal	51.47	198.16
Sigma Designs HHK-G2000	189.59	0.00

PHYSICAL FORMAT TIME

High: 976.30

Average: 311.82

Low: 51.47



again. For example, if you want to use the BACKUP command, you can simply go to the directory where you've stored *Command Assist* and type HELP. The program will provide you with an alphabetical list of DOS commands. If you type in BACKUP, the program will display an explanation of the command format, and you can then execute the command from within *Command Assist*. Now why didn't IBM think of that?

All in all, IS 10 offers economical hard disk storage without much installation hassle. The process was long, but uneventful. If you don't mind the noise, you'll probably like IS 10.—Dara Pearlman

3

FALCON TECHNOLOGY PC EXTENDER

Falcon Technology's PC eXTender is a lot more than an internal hard disk for the PC. It includes the fastest 10-megabyte hard disk we reviewed, as well as a multilayered controller board sporting a clock, a serial port, and memory expansion sockets for installation of up to 192K of RAM. While Falcon has gone to great lengths to make installation simple and includes pre-folding and trimming cables with the disk, the unit is tricky to install, simply because of the number of different features included. A ROM BIOS chip must be installed to allow booting from the hard disk. You must carefully follow instructions for setting switches on the controller board. PC eXTender comes with a small, internal

auxiliary power supply, though the unit will run without it under most PC configurations. Falcon supplies a program, HFORMAT, that creates both the physical and logical disk formats. Other software furnished includes a special backup program and a program for preparing the disk to be shipped.

The performance of PC eXTender is outstanding. Though the published seek time is no shorter than that of other drives, the actual performance with application programs we tested was lightning fast, twice as fast, in fact, as the other internal hard disks we examined. Every other disk took 3 seconds or more to load *SuperCalc*. Loading from PC eXTender, the program copyright screen appeared in under 1 second! A 50K spreadsheet file loaded in 3 seconds less than with any other disk tested.

In spite of the fact that this disk system costs the most per megabyte, this unit is a good buy. It offers many of the important features missing from the standard PC, and for speed fanatics, the high-performance disk alone is worth the price.

—D.B. and S.V.

4

5

EVEREX EVERDISK

The relatively low price and simple packaging of Everex's 10-megabyte and 20-megabyte Everdisk hard disks might make you think of the adage, "You get what you pay for." But you'd be in for a

pleasant surprise: both of these disks are not only extremely easy to install, they also perform well.

From the time you remove the second disk drive in a standard PC, you can install and format the unit in under 20 minutes. Each disk comes with its own controller board, and you don't have to change any switches. The drives come with a program that does the physical formatting; the DOS program FORMAT.COM does the logical formatting.

Both the 10-megabyte and the 20-megabyte disks are good, though the 20-megabyte disk is slightly noisy. Both disks perform most operations at a speed comparable to that of other disks that were tested.

Hats off to Everex for trying to make hard disk storage affordable. If their long-term reliability is as good as their performance in our tests, these disks will be good investments.—D.B. and S.V.

6

QUADRAM 12-MEGABYTE QUADDISK

Quadram's 12-megabyte QuadDisk offers PC users additional storage with a bonus—a software interface for DOS that offers several powerful utility programs. The disk's performance is good; the system's only shortcoming is some annoying errors in the documentation.

The disk comes with Quadram's auxiliary power supply, a black box that sticks out about 3 inches from the back of the PC

once installed. Many PCs do not require an auxiliary power supply with the 12-megabyte QuadDisk, but one is included in case you have an internal modem or some other extra equipment that uses a lot of your PC's power.

We couldn't format the disk on the first try, owing to a faulty controller board that

Once installed, the QuadDisk works well. Although it makes an awful racket during start-up, the drive is relatively quiet during operation.

the manufacturer replaced. The manual hindered diagnosis of this problem by listing the controller board's DIP switch settings incorrectly.

With a new board, we installed and formatted the disk in 20 minutes. Unfortunately, the package we received did not contain a faceplate for the gaping hole left in the front of our PC by the half-height drive. If you choose this drive, you should probably team it with another half-height device.

Once it is fully installed, the unit works well. Although it makes an awful racket during start-up, the drive is relatively quiet during operation. Programs loaded from

QuadDisk in average time.

Unlike the other hard disks reviewed, QuadDisk comes with a powerful software program called the File Utility System (QFUS). You can use the disk with or without QFUS, which creates a windowed interface between you and DOS. The opening menu has three windows, one of which shows the current disk directory, with command choices displayed at the bottom of the screen.

With QFUS, you can sort the DOS directory by name, size, date, or extension. You can use the arrow keys to select a program from the directory, and simply pressing a key runs the program—you don't have to type in the program name. Also, QFUS has a utility to partition your computer's memory to run more than one program at a time and can run batch files at the press of a key. One very good feature is that the screen automatically dims after 5 minutes without keyboard input; pressing a key reactivates the screen.

There are other comparably sized internal hard disks that are as good as QuadDisk and that actually cost less. However, the software interface and good customer support from Quadram make the disk worth the higher price.

—D.B. and S.V.

7

SIGMA DESIGNS HHK-02000

Sigma Designs's 20-megabyte hard disk offers a powerful solution to your PC's storage shortages. If you think you

WRITE TIMES

(in seconds)

PLUG-IN HARD DISKS

	Record size in bytes			
	128K	300K	512K	576K
Micro Design iS10	15.19	20.91	13.92	15.51
Micro Design iS30	16.77	21.66	15.74	18.73
Quadram QuadDisk 12 Megabyte	14.76	18.93	13.59	17.59
Quadram QuadDisk 72 Megabyte	19.81	18.55	13.06	16.62
Everex EverDisk 10 Megabyte	15.91	19.59	13.75	17.78
Everex EverDisk 20 Megabyte	21.20	18.38	13.07	17.17
Kamerman Labs Megafloppy MF300	14.94	18.38	12.69	16.92
Falcon Tech PC eXTender	15.03	20.93	11.93	16.64
Mate Comp XT Internal	19.79	17.87	13.95	17.91
Sigma Designs HHK-02000	13.82	18.00	12.51	16.31

WRITE TIME

(for 128K records)

High 21.20

Average 16.72

Low 13.82



FACE-OFF

"The driver from the program didn't work, but I have one of these printers at home.

The *PeachCalc* team was also scrambling to finish. "The big problem now is that *PeachCalc* won't let us insert more than one row at a time," said Don Dysert. "All we're trying to do is create enough room at the top of the spreadsheet for headings, but look at this!" He pointed to the screen as Lynn Baklor manually inserted blank rows one-by-one. Meanwhile, the program recalculated for every insertion, and the team tore off its printout just as the bell sounded, signaling the end of the first problem.

The *Framework* team had enough time to get fancy with its printouts, using the different fonts and type sizes, and it was the first team to finish, 10 minutes earlier than any other. Team member Mike Barry admitted, "We were trying to make it fancy, and we ran into some problems. We didn't make it as flexible as it should have been. But we did get an answer, at least."

Hood and his MicroTrek associates Michael Wilding and Paul Goldner evaluated the printouts using three major criteria: accuracy of the financial answers, speed, and the physical appearance of the printed worksheets.

Framework's team was clearly the winner, not only because it finished early, but also because its printout was judged best on appearance. *PeachCalc*, came in second place with what Hood described as a "decent-looking printout." The *VisiCalc* team took third because it had one minor error, in the analysis section. It was the second team to finish the problem, but the look of the printout was judged poor. The only runner-up to the top three was the *Multiplan* team, with a good-looking spreadsheet that was riddled with errors.

Mike Barry of the *Framework* team attributed his team's win to two things. "*Framework* was easy to use and helped us crank out the work in such a short period of time," he said. "And this problem was just the kind of thing I used to do as a CPA."

A Sophisticated Model

After lunch, the students returned to the conference room for Ray Hood's explana-

tion of the second problem. This time, each photocopied packet was only two pages long.

The difference between the first and second problems was like night and day. While the students perceived the first as "all data," they described the second as "all formulas." The teams were given 3 hours to develop a general-purpose model for evaluating a wide variety of lease vs. purchase transactions based on net present value.

While the teams were formulating their strategies for attacking the problem, Hood commented, "These folks are very good. They are doing very well, and I think they will all solve this problem—even the

pfs:plan team. They're going to have to overcome a lot of obstacles in their software, but they should be able to do it. *PeachCalc* will struggle, too. This problem was designed to test the more advanced features of the spreadsheets, like the financial functions."

Indeed, neither the *PeachCalc* nor *pfs:plan* team had a payment function. But both teams seemed undaunted by the limitations of their spreadsheet programs. In fact, now that they were familiar with those limitations, they could work more efficiently than they had earlier that morning. It was becoming obvious that given a group of bright minds, even mediocre software would do the job.

The Framework team formulates its strategy for solving Problem 2.



The members of the *VisiCalc* team felt they were doing much better on the second problem, and they were hoping to finish up their work early for the weekend and get to experience some of the diversions that New York City has to offer. "The other problem this morning was all cosmetics," said Jeff Rabetz. "This one is all formulas. It's much better." Added John Goodrich, "Your basic Wharton nerd gets off on a problem like this. It's what we like."

The *Symphony* team also liked the second problem better than the first because, as Craig Corelli said, "it taxes our brains more than it does the spreadsheet, what little brains we have left." But his teammates Bob Blake and Dewey Shay remained confident they would place among the top teams for this problem as they alternated turns at the keyboard. "There's room to move around in this problem," said Blake. "You can get creative and that's what we like to do."

The 1-2-3 team seemed more confused than ever and maintained a fairly constant state of bickering about how to approach things throughout the second problem, as did the team with *The Smart Spreadsheet* program, which had gotten the lease part correct but was way off with the purchase model. The lack of financial knowledge on the part of the 1-2-3 team was showing, despite what the teams members claimed to be reasonable familiarity with the program. For inspiration, the 1-2-3 team pinned up a two-page photograph from the *Sports Illustrated* swimsuit issue but were later heard to admit that "Kathy has not bailed us out of this one."

Late in the second problem, the *Multiplan* team's computer began emitting sounds like an automobile security system gone berserk. Hood investigated. "You've locked your cells," he said. "Yeah, we locked the cells," Adam Gordon confirmed, "but now we want to forget about that and unlock them. We tried to blank over a lot of locked cells." Asked why they got locked in the first place, Gordon responded "This is New York. You don't just leave a spreadsheet lying around unprotected." The team admitted it was having some trouble getting past problems with the software and into the work at hand.

Donna Berry, another flu victim who had sat out the first problem, rejoined the *SuperCalc3* team at about 3 p.m. but didn't stay very long because she was "saving [her] strength for the big problem." Apparently, she was very helpful. She seemed to know a lot about spreadsheets and had spend her 24-hour flu studying the problem and boning up on *SuperCalc3*. All three members of the team had nothing but praise for their software at this point. They needed help and



PLUG-IN HARD DISKS

can get by with using merely a 10 megabyte disk today, you'll be surprised at how quickly you'll wish you had 20 megabytes of storage or even more. Priced at \$1,595, this disk costs about \$800 per 10 megabytes of storage, which makes it a very good deal.

Of all the plug-in hard-disk units that we tested, this disk was hands down the easiest to install. The controller board is ready to insert into an expansion slot on the back of the PC and it even comes with cables attached, ready to connect to the disk drive. The whole installation procedure took just a little over 5 minutes to complete. The instructions for installing the disk are brief, but they are adequate to help you do the job.

It is a nice surprise to find out that the manufacturer has already done the physical formatting for you. If you simply want to run the entire disk under DOS, all you have to do is run the standard DOS program **FORMAT.COM**, which only takes about 3 minutes. We were able to get **WordStar** up and running on the Sigma

disk less than 15 minutes after we opened up the box.

The Winchester drive, manufactured by Tulin Corporation, works quite well and its operation is reasonably quiet. The disk performed more slowly on our benchmark read/write tests than some of the other disks that we looked at. However, it loaded both **WordStar** and **SuperCalc** more quickly than almost every other disk that was tested. The time that the Sigma disk took to load a 48K spreadsheet file was in the middle range of all the times recorded.

The hard disk unit boots up the entire system. A ROM chip installed on the controller board contains software that allows the PC's BIOS to recognize the ROM chip and to boot directly from the Winchester drive.

The Sigma disk is one of the best buys around for the money. The cost is low, the performance is good, and you should have no trouble installing it yourself. You could easily pay just as much money for half the amount of storage.—D.B. and S.V.

8

KAMERMAN LABS MEGAFLIGHT

If you don't mind a trade-off between storage capacity and speed of access, Kameron Labs's 30-megabyte Megaflight hard disk could be the answer that you've been waiting for to all your PC's storage problems. Though this is one of the highest-priced units that we examined, it offers you quite a few megabytes of memory per dollar.

Installation of the unit is fairly straightforward. The drive itself is not as wide as the drive slot in the PC; however, extra side brackets are provided to mount the disk properly. This mounting takes more time than some other units, but once installed, the unit fits into its appointed slots snugly enough. The controller card comes ready to install and holds no DIP switches that you have to set.

The documentation provided with the Megaflight hard disk is adequate but seems

SEQUENTIAL READ TIMES

(in seconds)	Record size in bytes			
	128K	300K	512K	578K
PLUG-IN HARD DISKS				
Micro Design IS10	2.36	5.99	9.28	11.06
Micro Design IS30	2.38	5.99	9.21	10.60
Quadram QuadDisk 12 Megabyte	2.18	5.33	8.00	8.42
Quadram QuadDisk 72 Megabyte	2.23	5.15	7.34	8.13
Everex Everdisk 10 Megabyte	2.62	5.47	7.78	8.73
Everex Everdisk 20 Megabyte	2.66	5.29	7.67	8.59
Kameron Labs Megaflight MF300	2.25	4.94	7.20	8.33
Falcon Tech PC xTender	1.92	4.45	6.41	8.44
Mint Comp XT Internal	2.50	6.39	8.07	8.86
Sigma Designs HHK-02000	2.05	5.09	6.87	8.24

SEQUENTIAL READ TIME (for 128K records)

High 2.66

Average 2.32

Low 1.92



RANDOM READ TIMES

(in seconds)	Record size in bytes			
	128K	300K	512K	578K
PLUG-IN HARD DISKS				
Micro Design IS10	15.60	20.85	18.89	25.47
Micro Design IS30	10.36	15.19	12.87	20.52
Quadram QuadDisk 12 Megabyte	10.97	16.92	14.87	20.16
Quadram QuadDisk 72 Megabyte	6.72	11.35	9.03	14.39
Everex Everdisk 10 Megabyte	14.66	20.60	18.34	23.89
Everex Everdisk 20 Megabyte	15.65	21.40	18.77	24.40
Kameron Labs Megaflight MF300	9.37	14.54	12.09	18.71
Falcon Tech PC xTender	8.58	13.00	12.91	17.74
Mint Comp XT Internal	14.34	19.54	18.16	23.21
Sigma Designs HHK-02000	11.66	16.66	13.95	21.42

RANDOM READ TIME (for 128K records)

High 15.65

Average 11.79

Low 6.72



FACE-OFF



SuperCalc3 was giving it.

Toward the end of Problem 2, the *pfs:plan* team was "ready to go out for drinks," according to Stephanie Simon. "It won't do a declining mortgage payment. This thing is so simple. It's like a cash register." Just then, a light bulb blew out right above their table. "I am in charge of team spirit," said Simon, "and you don't know what that's like until you've played with *pfs:plan*."

Hood had only praise for the handicapped *pfs:plan* team. "They are one of the best. And they know they are operating with one hand tied behind their backs. They're never going to come up with exactly the right answer. But they're plugging away as if they will."

At 3:45, with only 45 minutes left until the end of Problem 2, Rick Goc from the *Enable* team could only say the group was "burnt out." The three had found some bugs in the software, and getting around them became difficult. Still, by 4 p.m. they felt they were almost finished and began preparing to print.

With only 15 minutes left, the *Multiplan* team was as silent as a group of mourners. Adam Gordon admitted that Problem 2 was a tough one. He said, "There are so many different assumptions you can make here that it becomes very difficult to say if one answer is more right than another."

Hood and his MicroTrek associates evaluated the printout results of the second problem using the same criteria as for the first: accuracy, speed, and appearance. Once again, all ten teams completed the task and handed in printouts, though many were pressured to do so at the very last minute.

And once again, the *Framework* worksheet was judged the winner. The team's models were 100 percent correct; it finished nearly half an hour before the next team; and its printout looked very good. The *Symphony* Three came in a close second—their models were as good as those of the *Framework* team, but it took them longer and their printout was of only average quality. The *PeachCalc* team, the second-place winner in the first problem, placed third. Its models were also accurate, but it was the last team to finish. The printout from *PeachCalc*, however, was

judged good, so the *Symphony* team did not beat it by much. The other seven teams weren't even in the running because their models were inaccurate.

The All-Nighter

At 5 p.m. Ray Hood passed out the third problem, and its size seemed to make many of the students feel like passing out. They had been working hard all day, thinking about a New York night on the town, but those visions began to fade as Hood began to speak. What he described was a problem of marathon proportions.

Hood told the students that their boss wanted to acquire Cola World Corporation and that he was willing to pay 20 percent over its book value. The first part of the task was to determine the true value of the company and analyze the potential acquisition. The second part would require the students to present their findings to a board of directors and make a recommendation based on their analyses by 1 p.m. Sunday. "You'll only have 15 minutes to present, so you should summarize your findings on a one-pager," warned Hood. "You're dealing with executives. They get bored after one page. Numbers only. No graphs. No text."

Each team then received a briefcase containing the necessary photocopied financial data on Giant Food and Cola World, as well as on the soft drink market. The students also found a copy of *The New York Times* (presumably to check financial market conditions or the stock price of Coca-Cola, Pepsi, and Dr. Pepper), a pad of paper, and some pencils.

The students regrouped into teams for half an hour or so to study the problem, and a few even began tapping at their keyboards. But by 6:30 p.m. the room was empty. One by one the teams had decided Problem 3 was big enough to warrant a leisurely meal, and for the next several hours the only movement in the room was from ten blinking cursors.

By 9:30 at least one or two members of each team were back to work, most already feeling overwhelmed by the deadline. It was unanimously admitted that students regularly pull "all-nighter" sessions but that this situation was more like the workings of the real business world than what they worked on at school.

The *Framework* team felt confident with the software, but the three were a bit worried by not having taken their finance courses yet. "We're marketing managers," said Mike Barry. "What do we know about acquisitions?" Already, the team didn't think it would recommend purchasing Cola World. Doug Treff had big problems believing that Cola World would get anywhere near the predicted 18 percent market share in 4 years. Asked if it wasn't their job as acquisition people to acquire Cola World, Sam Murphy replied, "It wouldn't be your job for long if you started acquiring bad companies."



The *Multiplan* team was working on various methods of pinning down the true market value of Cola World. Eventually, it settled on three methods. It wanted to calculate the problem using each of the methods and base its conclusions on an average of the three. Adam Gordon hung up the telephone—the scope of the problem forced him to cancel his date for the evening. "I hope the editors realize that this is getting serious," he said.

Hood observed, "The thing that has them screwed up now is that they know the franchises are going to lose money, and the temptation is to say you don't want to acquire. But over the last year franchises have done really well. Look at ComputerLand. Five or 10 years ago, who'd have thought it would become a multimillion dollar chain?"

Hood also admitted that he and his partners had been playing around with the numbers the night before and that the balance sheet didn't balance. It was not off by much, but just enough to keep them wondering about the figures. "Nothing ever balances in real life," Hood said. Still, he expected them to come up with a value for the company that was "reasonable, but that is obviously less than what shows from the figures. But it's not that much less. The problem was designed to prove a spreadsheet is a tool, not an infallible magical thing that prevents bad thinking."

At midnight, Andy Pickar sat alone with *SuperCalc3*, sipping Perrier and thinking about the lookup tables he was about to build. Donna Berry was still sick, and his other teammate was having dinner on Long Island and was expected back shortly.

He began typing in numbers for his table. Asked what he thought of the third problem, Pickar said, "I'm not really qualified from a financial standpoint to say. I'm 4 weeks into my first finance course. It certainly seems like a real-world problem. I don't know enough about all this to tell if the numbers are real or not. Cola World has set up its revenue structure in a very precarious way. It is not assured of any future earnings except on sales. It has a 4-year window, but that's about it. After 4 years, there is no base it has been building. It gets franchises to join it, to buy its goods, and after 4 years the franchises

Removable-cartridge hard disk systems offer you fast backup, data mobility, and protection that's hard to beat—if you can overcome the problems of high power demand, expense, and fragility of the cartridges.

PORTABILITY MEETS PRIVACY

Removable-cartridge hard disk drives are something old and new, a few things borrowed, and, most of all, a spin-off of something blue. These cartridges borrow the old Winchester-drive technology pioneered by IBM. In fact, they are basically a repackaging of the old, bulky, and hermetically sealed Winchester platter into a cartridge that can be carried in a large pocket.

Currently, two OEM companies seem to be battling for the lead in the removable-cartridge market—SyQuest Technology in Fremont, California, and DMA Systems in Goleta, California. Each company has a slightly different approach to the technical problems of removable hard disks. SyQuest's cartridge is small—4½ inches square by ¾ of an inch high. It could fit in a large shirt pocket. DMA's

Micro-Magnum cartridge is slightly larger—about 5½ inches square and ¾ of an inch high. These cartridges are certified for a specific capacity, but end-system manufacturers often format 5-megabyte drives for 10-megabytes of storage.

Both SyQuest and DMA manufacture drives for their cartridges. These drives are, in turn, integrated with the controller boards, software, and documentation needed to make complete systems by such companies as Quadram, Tecmar, IDEASociates, and Genie. The complete drives use similar addressing and control techniques, and I have seen different companies package nearly identical controller cards with both brands of cartridge drives.

Power Penalties

If you want to add an internal hard disk to your system, fixed or cartridge, you have to keep the limitations of the standard PC's 63.5-watt power supply in mind.

Even though the DMA and SyQuest drives are low-power devices that pull 19 and 12 watts, respectively, the power drain could be too much if you have a full load of circuit cards, especially power-hungry I/O boards. (The XT's supply was increased to 130 watts to handle this overload problem.)

For example, when I first tried one cartridge drive in my fully loaded PC, it shut down the entire system. Apparently, this new drive's start-up current was just enough to overload my power supply. I

pulled out my multifunction and extra I/O boards and the system came back to life. After I let the drive run for a few minutes, I put the boards back in. It seems that the drive only needed to be broken in; it never drew enough current to shut down the power supply again. The moral of the story: Watch your power budget!

Adding Power

The only way to increase your power is to use a separate power supply or to replace the standard PC's supply with one for an XT. Quadram has developed a separate power supply for its internally mounted drives. This device saves money and lets you fill your PC to the gills. Other companies make external cabinet/power supply combinations that give the same performance as the internal systems but take up more room.

Incidentally, adding one of these removable-cartridge drives to a PC-XT is practical and operationally sound. If you replace the regular floppy disk drive with a half-height drive, you can have a floppy, cartridge hard drive, and the XT's standard fixed disk in the same machine. You can use the XT's hard disk for daily work and then back the work up on cartridges. The XT's power supply can handle the load, and this setup allows for very fast backups, portability, and safety.

Spinning Disks

The advantages of removable cartridges include portability, safety, and pri-



- ◆ Genie XL10P
- ◆ Quadram QuadDisk
- ◆ IDEASociates IDEAdisk
- ◆ Tecmar PC-Mate

are on their own and Cola World won't be making anything from them."

By 1 a.m. Sunday morning, the *Framework* team felt comfortable enough with its progress to go and get some sleep, though, as Doug Treff admitted, "This third problem is a bear. If we were doing this in a real business situation with real money at stake, we would never make a presentation based on what we've done here. We'd lose our jobs even if we stayed up all night! But I do think *Framework* has given us a little edge. I'm looking forward to getting the program and I don't even have a personal computer yet. *Framework* is a very

good reason for me to buy a PC."

At 3 a.m., six members of five teams remained, and suddenly, something unprecedented happened, perhaps induced by the fatigue. Most teams had kept to themselves in the true spirit of competition, but now they began openly discussing their basic strategies—not the answers they were coming up with, just the general methods for attacking the problem. No one wanted to complete so much work without some reassurance that they were on the right track. Toward morning, as more students trickled back to work, they too joined these discussions.

Over breakfast Sunday morning, members of the *Symphony*, *VisiCalc*, and *Enable* teams wondered about their work. "In the 6 months of statements we have, the company shows income of \$27 million," said John Goodrich of the *VisiCalc* team. "Where did the losses come from? There must have been a history." *Symphony's* Dewey Shay commented, "We would get tossed out of the investment bank for presenting this. The analysts wouldn't even look at it. We haven't got enough financial information." His teammate Bob Blake added "It's an interesting problem, but it's certainly not a merger problem. You can't do an evaluation based on 6 months of financial statements."

Asked if it was the group's job to acquire Cola World, *Symphony's* Corelli responded "It's our job to evaluate. After you acquire, you will quickly find out whether or not you screwed up. If you acquire and the company starts losing money, everyone looks at you and says, 'These are your projections, and here are the cash flows. We don't really see the correlation.' Then you no longer have a job."

Back at the *Framework* table, Sam Murphy studied a printout and explained his team's gut feelings. "The first couple of years look bad, and then you get very good profits for a year or two. We don't see any reason to acquire this company, unless we could get it for peanuts. I think our net present value came out to \$10 million. Book value is around \$67 million. So I think we'll pass."

Mike Barry remarked about the third

problem: "I think the problem now is testing the teams more than the software. It's 80 percent experience and 20 percent software. I don't think *Framework* made a difference yesterday, but today it's making things a lot easier for us to output the work."

The Nays Have It

By noon on Sunday, the teams had no choice but to print their results, create a summary sheet, and prepare to defend it in front of Giant Food's board of directors. The board, which would judge this third problem based on both the quality of the answers and the quality of the presentations, was comprised of four distinguished New York business executives: John H. Andren, Jr., vice president of analytical computer services for Manufacturers Hanover Bank; James Kovacs, audit partner in charge of mergers and acquisitions for Price Waterhouse; Gail Harrity, manager of purchasing for the Metropolitan Museum of Art; and Robert Lehmann, vice president of Transway International.

The panel of judges didn't need an explanation of the correct answer from MicroTrek, each having pronounced Cola World as a worthless acquisition within minutes of looking over the financial data the students had been given.

For the judging, a part of the conference room was sectioned off and transformed into a courtroom. Several long tables were linked to form a dais for the judges. Three chairs were placed directly in front of the dais for the students, and in the remaining seats along the sides were PC staff members, various corporate onlookers, and a camera crew that filmed the event. Only the team giving a presentation was allowed in the room; the rest had to pace nervously outside.

The students were barely recognizable when they returned from their rooms after changing out of their casual preppy garb and into regulation corporate dress. With just 15 minutes per team for presentation, the students felt every detail would count.

The majority of the students appeared nervous in front of the judges, but that was to be expected because few had been in this position before. Their assumptions, predictions, and conclusions were picked

instructions, you can't start a new cartridge. Perhaps this dependency on DEBUG could be chalked up as a case of "new productitis," but Genie's older products use DEBUG too.

After the cartridge is formatted to match the controller and drive, the standard PC-DOS FORMAT/S command creates a DOS directory on the cartridge. The Genie software disk includes a fast copy program that allows quick backups between cartridge and fixed-disk systems.

The Genie software disk also includes a fast drive-to-drive copy program that allows you to make an identical backup of any hard drive. If a removable-cartridge unit is either the source or target drive for copying, and the other drive has more capacity than the cartridge, this copy program will stop and prompt you to insert another cartridge. In this way, you could use two 10-megabyte cartridges to back up a 20-megabyte fixed-disk drive.

Open Sesame

A small drawback of the DMA drives is their need to have the power on before you can open the door and insert or remove a cartridge. If you shut off the computer (or suffer a power failure), you have to wait until the power is back before the door will open. This is a small inconvenience, but it could be important in some instances.

If you don't read the manual, you may not realize that you must turn the drive on with a small switch on the front. Similarly, you should turn the drive off before you turn off the power to the computer so it can properly spin down and retract the read/write heads from the cartridge.

The Genie manual included with the cartridge system was marked preliminary, but the manuals for its other systems include illustrations, technical data, and indexes. They do a good job of describing the installation and operation of the systems. One can only hope the final version of the cartridge-system manual is as thorough.

Overall, the XL10P is a fine, high-capacity (10-megabyte) cartridge system that you can easily add to a 256K PC. The drive uses the PC's power supply, so you should keep the limits of the standard power supply in mind and reduce the number of full-size expansion cards in the PC.

QUADRAM QUADDISK

Quadram was one of the first companies to market internal add-on hard disk drives for the IBM PC, and has done a very thorough job of preparing its cartridge drive. Its QuadDisk system is complete, easy to install and use, and seems to be compatible with all PC software.

The Quadram internally mounted removable-cartridge system is based on SyQuest's 5-megabyte cartridge and drive. If you add the QuadDisk to a PC with a 256K motherboard, you don't have to install any special software to integrate it with DOS or reassign drivers using a CONFIG.SYS file. The boot routines are contained in ROM on the controller card. A PC equipped with a QuadDisk can boot from the hard disk if you leave the door of the A: drive open, just like the XT.

HARD DISK SUPPORT FOR "OLD" PCS

Integrating a hard disk system into a PC built before March 1983 requires special software.

Some companies supply this software, but others ignore the problem.

The internal programming and system board of the standard PCs manufactured after March 1983 were changed to give the unit the ability to hold a total memory of 640K bytes with 256K bytes of memory on the main system board. The PCs manufactured prior to that time had a maximum limit of 544K bytes with only 64K on the main board. These "new" machines also contain a new ROM that allows the system to initially boot from an internal hard disk if it is present. The "old" PCs with a 64K motherboard can not boot from a hard disk.

Special software has to be supplied by the company selling the hard disk package to integrate the hard disk drives into the operating system of "old" PCs. Some companies provide this integrating software in a ROM chip on the disk-driver card. Other companies include it on disk for the CONFIG.SYS file. Some companies ignore the problem and don't provide any solution for the folks with an "old" PC.

Of the two approaches that deal with the problem, including the software in a new ROM is by far the best method. Some applications programs require their own CONFIG.SYS files containing

device commands that conflict with those commands needed by the hard disk drive.

Two Examples

Quadram's integration of the SyQuest products, the QuadDisk, recognizes the problems inherent in expanding the capabilities of PCs with 64K motherboards. If you add a QuadDisk to one of the early PCs, you have to run a very short program as part of an AUTOEXEC.BAT file that calls the hard disk software from ROM on the Quadram controller board. This solution means that old PCs can not boot from the hard disk, but if you arrange the AUTOEXEC.BAT file correctly, the difference is invisible to most users.

Conversely, the Genie manual clearly states that its fixed disk systems can not be used with PCs that have 64K motherboards, but the situation with the Genie cartridge systems isn't as clear at first glance. The cartridge-drive manual gives instructions for using the earlier version 5-megabyte Genie cartridge drives on a 64K motherboard, but a call to the company revealed that the new 10-megabyte systems could not be used with the older machines. —F.J.D.

FACE-OFF



always make a big difference in a presentation. You always look better prepared and better informed with visuals."

The *SuperCalc3* and *Enable* teams, both of which had failed to place in the previous two problems, easily took second and third place. Try as they might, the judges couldn't shake the teams' faith in their answers. The winning teams were doubly pleased with their success because all nine members are in their first year at Wharton and have not yet taken any of the

school's finance courses.

Framework, *SuperCalc3*, and *Enable* had the right numbers and the right answer—don't acquire Cola World—as well as the guts to ignore the judges' attempts to sway them in other directions. Two other teams, *1-2-3* and *VisiCalc*, had arrived at the right answer but allowed the judges to sway them. Both teams were on the right track, despite some errors in their calculations. The *1-2-3* team could not justify an acquisition, yet Mike Crooks was

moved to say his team would "recommend the purchase if there are invisible synergies at work of which we are unaware." Jeff Rabetz of *VisiCalc* called the acquisition "an obscene investment" at one point but backed off by recommending a lower purchase price.

Many other teams devised elaborate schemes with which to justify their recommendation to acquire Cola World. *PeachCalc*'s Greg Fraser proposed the creation of a third corporation called Ugetful

very good. The manual is well illustrated and easy to read and understand. It lacks an index, but the table of contents is detailed.

The QuadDisk is a quiet and conservatively engineered system that deserves strong consideration if a removable-cartridge system is on your shopping list.

3

IDEASSOCIATES IDEADISK

IDEAssociates (IDE) has been marketing add-on hard disk drives for the PC since early 1983. Its products are strongly advertised and well supported, but this company has gone its own way in integrating a cartridge drive system into the PC. Its different approach has both positive and negative results.

The IDEAdisk cartridge system uses the SyQuest drive and cartridge. In addition, IDE uses its own unique, two-part disk-controller card. The part that fits into the expansion slot of the PC is a short board that is easy to install. The other half of the controller card sits on top of the drive itself, effectively turning it into a full-height device. This arrangement may have some advantage if you have a double-wide or piggyback expansion card in the PC and want to reduce the crowding. However, it does prevent you from stacking any other kind of drive in the slot with the IDEAdisk.

Mechanically, the IDEAdisk is the easiest to install of all the drives reviewed. You simply attach the cable coming from the drive to the card and insert the card in a slot. The drive itself has a full-height bezel on the front, so there are no special brackets to assemble. After you insert the two screws to hold the drive in the PC, you can put on the cover.

But the software for the IDEAdisk is not as simple to install. The IDEAdisk comes with two floppy disks of software. The first contains a special file that must be written to another floppy that starts up the system. The second disk has programs that can be used to make changes to the special file on the first disk. The name of

this special file must be included in a CONFIG.SYS file at boot-up.

This approach to integrating the hardware and operating-system software has two drawbacks: First, it makes it impossible for the PC to boot from the hard disk (fixed or cartridge). This restriction eliminates one of the nice advantages of a cartridge system—the ability to boot from the cartridge and customize the machine it is running on with an AUTOEXEC.BAT file. Second, the statement in the CONFIG.SYS file tells the computer to use the special IDEAdisk file as a "device." Unfortunately, some programs also use the DEVICE statement for other purposes. Potentially, you could find yourself unable to use certain software with the IDEAdisk because both the applications program you are using and the disk itself have designated a unique device file.

Device Problems

The use of a special device file was common when the first add-on drives for the PC were introduced, but this approach has been dropped by almost all other integrators in favor of ROMs on the controller board. However, the special device file does allow the IDEAdisk to be used with both 256K and older 64K PCs (see sidebar, "Hard Disk Support for 'Old' PCs").

The emphasis on floppy disk software

WORDSTAR LOADING TIMES

(in seconds)	
REMOVABLE CARTRIDGES	
IDEAssociates IDEAdisk	1.33
GENIE XL 10P	1.24
Quadram QuadDisk	1.10
Tecmar	1.23

LOADING WORDSTAR

High: 1.33

Average: 1.23

Low: 1.10



for integration in hard disk drives has one advantage—flexibility. Devices such as hard disk drive controllers and local area network interfaces make use of the direct memory access (DMA) capabilities built into the PC. DMA access is controlled according to "channels." When controller, memory, and networking cards try to use the same DMA channel, the result is

Mechanically, the IDEAdisk is the easiest drive to install. You simply attach the cable coming from the drive to the card and insert the card in a slot.

usually a locked-up machine with a "Parity Error" message on the screen. The IDEAdisk allows you to use a combination of software and switches on the controller card to reassign DMA channels. This ability could be very useful in the event of a DMA conflict, but it certainly isn't a task for the novice.

The first cartridge system I received from IDEAssociates for evaluation didn't work. I called the IDE technical support branch, identifying myself as just a customer and received excellent step-by-step instructions for troubleshooting. The IDEAdisk accessory disk contains a diagnostic program that returns error codes that can aid IDE's technical support staff. When I reported errors 1754 and 1726, I set them on a trail that led to a problem in the disk drive itself.

When the IDEAdisk was finally up and running, it was as quiet and simple to use as the Quadram QuadDisk based on the same SyQuest hardware. The IDE configuration program is menu-driven and relatively easy to use. The program has a lot of choices that will never be selected in normal installations. These choices give the flexibility I described earlier, but they can lead to a badly configured program if you

make several wrong selections. The IDEAdisk's accessory disk has a cache program that buffers frequently used disk sectors in RAM. This kind of program is supposed to reduce the number of disk actions and speed up operation, but its effectiveness depends a great deal on the kind of work you are doing and the way the applications software is written.

Documentation

The IDEAssociates manual is excellent. It contains many clear drawings, a glossary, an index, and a table of contents. The instructions for installation and operation are clear and accurate. The manual also has a quick-reference card to help with software configuration.

The IDEAssociates Winchester drive systems are well proven. The company is apparently sticking with a software arrangement that has worked for it. If you are certain you will have no conflict with its configuration software and don't need to boot from the hard disk, this system could be right for you.

4

TECMAR PC-MATE

The Tecmar PC-Mate removable-cartridge drive is part of a flexible and expandable series of products including add-on drives, disk drive sharing capabilities, and an optional power supply. Tecmar uses the SyQuest Winchester cartridge and drive. In addition, Tecmar combines the SyQuest products with a Xebec controller card and its own resource-sharing card, thus making it easy for you to add another drive to your PC. Like the IDEAdisk, Tecmar's PC-Mate uses a DEVICE statement in the CONFIG.SYS file to integrate the hard disk with the operating system.

Installation

You can install the Tecmar hardware in a few minutes. One word of warning: Watch out for the configuration switches on the PC's motherboard. You are

required to run the resource-sharing card's cable underneath any adjacent cards, and it can easily move across the switches and change a setting. If this happens, it might take you quite a while to find out why your PC won't boot.

Tecmar sells an auxiliary power supply for \$195 that screws on to the back of your PC. This power supply is very husky and could run a couple of the low-power drives. Unfortunately, the power cable coming from this supply is designed to run through the knock-out slot in the back of the PC, and, in my system, this hole is filled with the DB-25 connector from my multifunction board. Many add-on PC feature cards use the knock-out hole; if yours is already spoken for, something will have to give if you want to use the optional Tecmar power supply.

If you want to use your PC with a local area network, an add-on hard disk, and other hardware options, you might find it quite challenging to make all of the parts play together. Manufacturers sometimes use their own addressing and interrupt

REMOVABLE-CARTRIDGE HARD DISK SPECIFICATIONS

Manufacturer	Price	Amount of Storage	Media	Drive height	Software supplied	Hardware supplied
GENIE XL10P Genie Technologies Corp. 31117 Via Colinas, #402 West Lake Village, CA 91362 (818) 991-6210 CIRCLE 682 ON READER SERVICE CARD	\$1,995	10 megabytes	oxide	half	formatter	diskcontroller cards, cables
IDEAdisk (DPN 5-RH) IDEAssociates 35 Dunham Rd. Billerica, MA 01821 (617) 663-8878 CIRCLE 681 ON READER SERVICE CARD	\$1,995	5 megabytes	plated	half	configuration program, rapid copy program, disk cache, dynamic partitioning	short host adapter card, cables
QuadDisk (QD 7000) Quadram 4355 International Blvd. Norcross, GA 30093 (404) 923-6666 CIRCLE 680 ON READER SERVICE CARD	\$1,795	5 megabytes	plated	half	directory program; format and drivers for pre-March 1983 PCs	disk controller card, cable
Tecmar Removable Hard Disk (PC-Mate) Tecmar, Inc. 6225 Cochran Rd. Cleveland, OH 44139 (216) 349-0600 CIRCLE 679 ON READER SERVICE CARD	\$1,995	5 megabytes	plated	half	utility software	disk controller cards, cable, interface board

schemes for their products. Conflicts among different add-on cards over DMA channels or address locations can bring your computer to a halt. The Tecmar Winchester-Share card follows the Shugart Associates System Interface (SASI) designed to allow efficient communications between the computer and peripherals. This card will control two hard disks and allows multiple users to share the hard disk drives. This SASI card works with the Tecmar software to allow the reassignment of DMA channels and other configuration changes.

Tecmar Software

A utility program on the Tecmar software disk, called Speedisk, gives you a RAMdisk for fast storage. However, Speedisk uses the DEVICE statement in a CONFIG.SYS file just like the hard disk drive does. If you decide to use Tecmar's RAMdisk, you can't use its hard disk, and vice-versa. This is a perfect example of the kind of conflict that you can face when you have to depend on a CONFIG.SYS file to

initiate hard disk actions.

The Tecmar Tecdrive software must also be specified in a CONFIG.SYS file. The software can be configured in many

Tecmar's cartridge-formatting utility is easy to use and makes formatting new cartridges simple.

The software gives a very complete report of its progress and results.

different ways, but the options aren't specified in the program.

The options are defined according to the way the device statement in the CONFIG.SYS file is written. You can design-

nate different numbered drives, different types of drives, and many options by adding a dash and various letters to the DEVICE statement. If you read the manual carefully, this configuration method is fast and simple.

Tecmar's cartridge-formatting utility, called TECFOR, is easy to use and makes formatting new cartridges simple. The software gives a very complete report of its progress and results.

Easy Reading

The Tecmar manual is easy to read and contains programming examples and full details of the I/O operations. There is a glossary and a sparse table of contents but no index.

If you want a removable cartridge system that can be programmed and expanded in many ways, the Tecmar PC-Mate may be the right drive for you. The optional power supply can also be useful if you are on the thin edge of your PC's power budget. But keep the limitations of the CONFIG.SYS in mind. ■

Controller manufacturer	Drive manufacturer	Average access time	Ease of installation	Device drive	Compatible versions of DOS	Drive will boot the system
DATA Technologies Corp.	DMA Systems	77 milliseconds	easy	ROM, self-installing on controller	2.0 and higher	yes
DATA Technologies Corp.	SyQuest	70 milliseconds	moderate	CONFIG.SYS	2.0 and higher	no
DATA Technologies Corp.	SyQuest	70 milliseconds	very easy	ROM, self-installing on controller	2.0 and higher	yes
Xebec	SyQuest	70 milliseconds	moderate	CONFIG.SYS	2.0 and higher	no

MAKING A JUDGEMENT CALL

Our board of respected judges brought a wealth of professional experience to their unique role in the spreadsheet face-off.

James P. Kovacs joined Price Waterhouse, New York, in 1968 and was admitted to partnership in 1978. He is currently chairman of the Acquisitions and Mergers department. Kovacs received his M.B.A. from The Wharton School and is a member of the American Institute of Certified Public Accountants and the New York State Society of CPAs.

Seated are, l. to r., Wharton dean Anthony M. Santamero and editor Bill Machrone.

Gail M. Harrity is purchasing manager for the Metropolitan Museum of Art. She has worked as coordinator for a crisis-management consulting group in Mogadishu, Somalia, served 2 years as director of government affairs for the American Society of Travel Agents, and 5 years as legislative assistant to U.S. Senators Richard S. Schweiker and Charles McC. Mathias, Jr. She received her master's in public and private management from Yale.

John H. Andren, Jr., is vice president at the Manufacturers Hanover Trust Company. He has been with the company since 1975 as a credit generalist and loan officer and is now manager of computerized analytical services. Prior to joining Manufacturers Hanover, Andren worked as a loan officer for Franklin National Bank. He did his graduate work in accounting, finance, and computer science at New York University and at Rutgers University.



Half-height floppy disk drives consume less of your power, money, and PC slot space, but the one snag is selecting the perfect model. Reviewed here are four good alternatives that can help you double the efficiency of your PC.

DOUBLE YOUR DRIVING PLEASURE

Simple math proves that two full-height drives added to two PC drive slots yields zero available space. Therefore, if you want to add in a peripheral to your PC, you have to pry out one of your disk drives and suffer with a single drive system. The best alternative is to exorcise both your existing floppies and plug in a pair (or more) of half-heights.

Half-heights create a savings that go beyond slot space. They also tend to be cheaper than their taller counterparts. In fact, if you flip through the pages of *PC*, you'll undoubtedly find half-height drives priced as low as \$100 each, but the actual drive prices will vary according to the vendor from which you buy it. Overall, you'll lose only two things when you switch from full-heights to half-heights: a bit of power consumption and a lot of inconvenience.

Working with tools no more complex than a screwdriver, it shouldn't take you longer than 10 minutes to pull out your old drives and slip in half-heights. To avoid surprises during installation, however, you should make sure you have the required mounting hardware and electricity supply and understand the electrical set-up of the new drive so that it works properly with your computer.

The Nuts and Bolts

The IBM PC was designed for full-height drives. Its disk drive mounting shelf is punched with one horizontal pair of mounting holes on each side, and standard full-height drives have drilled and tapped holes to match. While most half-height drives also have a pair of threaded mounting holes on either side, these screw holes are often at a lower level than those in the PC drive shelf. Consequently, you can't conveniently secure the typical half-height disk drive inside your PC.

Fortunately, however, the more enlightened disk drive makers now add an extra pair of mounting holes that match up with the PC's drive mounting slots—at least for the bottom drive. But in most cases, you still need to tie a pair of drives together if you want to slide them both into a single slot. Most disk drive retailers understand this problem and either include a free mounting kit when you buy a pair of half-height drives or sell kits to match the brands of drive they carry.

Even if you have to pay for the mount-

ing kits, you'll find that they're well worth the extra cash because you won't have to spend the time searching for the necessary hardware. Moreover, since most disk drives are made in Asia and consequently use metric hardware, it's unlikely that you'll find the tools at the corner drug-store.

Set-up Switches

Most half-height disk drive retailers take the time to ensure that their drives will easily plug into your PC and play properly with no adjustments. On the other hand, if you buy a drive for a wholesale distributor or directly from the manufacturer, you'll probably have to set it up yourself by changing the jumper wires or doing some other such nonsense in your PC.

Most disk drives are assigned either a drive A: or drive B: identity so that they can properly interpret DOS commands. In many computer systems, the drive identities are assigned by moving a jumper or setting a DIP switch on the drive unit. On the PC, however, IBM eliminates the jumping around with a novel twist to the control cable that runs between the disk drive unit and its controller. Both drives are physically assigned as the second drive in the system, and then the cable twist straightens everything out.

Alas, not all disk drives leave the factory (or the dealer) set up to act as a system's second drive unit. To confuse matters more, different disk drive manufacturers have different ways of identifying the



- 1 Panasonic JU-455
- 2 Control Data 9428
- 3 TEAC FD-55B-01-U
- 4 QUME QumeTrak 142

drives in a system; most use numbers rather than letters, and while some start counting with 0, others start with 1.

To match a drive to your PC system, you set one or both drives in your system as number 1 if the manufacturer starts counting with 0, and you set both drives as 2 if the manufacturer starts counting with 1. The disk drive attached to the far end of the disk controller board (the one after the twist) functions as the A: drive. The drive attached to the connector in the middle of the cable acts as the B: drive.

Both disk drive connectors on the cable are supposed to be coded with a small plastic key that slides into a small gap in the mating edge connector on the disk drive, so that you cannot plug the connectors together backwards. However, the keys inside the connectors often fall out and allow you to connect your drives in such a way that they won't work. To avoid such mistakes, you have to make sure that the edge of the control cable with the blue stripe goes to the side of the edge connector on the disk drive that has the gap closest to it.

When installing half-height disk drives, you must also make sure that you have no more than one termination resistor in your system. The disk drive control system is designed so that it is "terminated," or loaded down, with a particular electrical resistance, which guarantees that the voltages circulating through the control system will be the right value. Most disk drives already have a termination resistor package installed when they are shipped from a factory. You should remove these termination resistors from all the drives you install in your computer system, except for the one that is to function as the A: drive.

The termination resistors almost always use dual in-line packages, so they resemble memory chips. Usually, you can identify a termination resistor in the midst of a sea of integrated circuits on a disk drive because it is often the only chip that's mounted in a socket. When more than one of the chips on the disk drive are socket-mounted, the terminator is most likely the one that looks different—it's either a different color (blue or white) or it's lumpier or glossier than ordinary circuit chips. If the termination resistor has already been

removed by a helpful dealer, you'll find an empty integrated circuit socket on the disk drive electronic card.

Disk Drive Tests

The hardest part of putting a half-height floppy into your system is, perhaps, finding the perfect drive. To determine whether any one model is superior to the others, I used Dysan's Interrogator disk drive evaluation system to test four popular models, which, incidentally, you can easily buy through PC advertisements. After putting the four models through their paces, I can honestly say that I found no significant differences in performance among brands (see Figure 1). Moreover, a run-through of the PC Magazine disk speed test shows no differences in reading or writing speed among the different models. In short, any of these models will work well in your PC.

Those results were hardly unexpected. Disk access times are mostly limited by DOS. Moreover, all of the drives follow the PC DOS disk standard, laying 40 tracks per disk side at a spacing of 48

You'll lose only two things when you switch from full-height floppy drives to half-heights: a bit of power consumption and a lot of inconvenience.

tracks per inch, otherwise known as double-density. All have two read/write heads for double-sided operation. Each one is built on a solid-cast aluminum chassis. The critical read/write head positioning mechanisms are all based on the same technology: a precision stepper motor pushing a metal band. In each case the heads are accurately guided by a pair of chrome steel bars.

All four drives look similar inside your PC. All have black faces, red light-emitting diodes, and levers that load the upper

head and block the slot so you can't shove a disk into a slot where one is already turning. Nevertheless, the four models I tested were far from identical. Some drives are difficult to mount inside the PC; others nestle right in as if they were designed to reside there. Some buzz like a hive of bees; others are quiet as angel's wings. Each has its own idiosyncrasies.

1

PANASONIC JU 455

This drive has more names than an English monarch. I received a pair from Oryx Systems that were ordered as Panasonic drives. The company says they are the same as Shugart 455 drives, model number SA-455. The boxes that they came in were labeled National, and the drives themselves bore the legend Matsushita on the back. (Matsushita owns the Panasonic and National brand names.)

The mounting scheme of the Panasonic disk drives makes no concession to the IBM PC. On each side, it has one pair of drilled and tapped mounting holes that will not line up with the holes punched in the PC disk shelf. Moreover, even though I purchased the drives from a mail-order retailer who knew their purpose, no mounting kit was provided. I had to struggle with their metric threads without aid or instruction.

Furthermore, unlike the other drives that have a lip on all four edges of the front panel, the Panasonic's bezel lacks a lip on its top and bottom edges. If you don't screw the drive in place, rocking it slightly can push it back into your PC.

Worse yet, although the drives came as a pair, they did not arrive properly set up for PC operation. Both drives had termination resistors installed, and the pair of drives were set up as numbers 1 and 2. I had to remove the terminator from the drive set as 2 and reset drive 1 as 2 to make the pair properly work in a PC. (Panasonic numbers drives starting with 1 rather than with 0).

Although the Panasonics give the impression of being made from more sheet

what they were doing, blamed the software. Slow recalculation times were their biggest complaint. They also found errors in the documentation, which lessened their interest in *The Smart Spreadsheet*. In fact, even its name began to grate on their nerves.

Benson admitted that *Smart* took getting used to. "When I am anchoring something, I keep hitting that period and can't break the habit from 1-2-3." Still, the team agreed that the spreadsheet had a lot of potential power. "If I didn't have a spreadsheet and were starting from scratch," said Benson, "I'd buy *Smart* because I know there is all this other software in the product line that will grow with me."

The Smart Spreadsheet
Innovative Software, Inc.
9300 W. 110th St.
Overland Park, KS 66210
(800) GET-SMAR(T)
(913) 383-1089
List Price: \$495

Requires: 256K RAM, two double-sided floppy drives or hard disk, PC-DOS 2.0 or higher.

CIRCLE 762 ON READER SERVICE CARD



Left to right: pfs:plan-ers Stephanie Simon, Dave Fricke, and Lynly Beard.

The pfs:plan Team

Lynly Beard, Dave Fricke, and Stephanie Simon felt less than lucky to have been assigned *pfs:plan*, the least powerful spreadsheet of the ten in the face-off. In

Fricke's words, "Problem number one was fundamental: this spreadsheet doesn't have cell referencing. When you refer to a cell in a formula, it is by row and column names. Our heading sizes are limited to a mere 25 characters. Period. It goes smaller, but no larger, and that got in the way a couple of times."

Everyone felt sorry for the *pfs:plan* team, but as several observers pointed out, the team members never showed signs of giving up. When their spreadsheet lacked a formula function, they constructed one out of large blocks of cells. They also ran into problems with printing, which eventually caused them to cut and paste pages together by hand. Simon admitted that the software was easy to learn, but not applicable to the types of complex business problems at hand.

One observer called *pfs:plan* a better-menu planner than a spreadsheet, eliciting laughter all around. "It really is a weakling," said Beard, "so we'll have to overcome its lack of brains by applying substantial muscle."

"For \$140, it's great," explained Fricke. "It recalculates quickly at first, but once you get a fairly good-size spreadsheet, it seems to wait for a while, and you are locked out. Speed of entry has been a problem. We would enter a formula, a title, a number, anything, with the Recalculation function off, and it would just sit there for 10 seconds as if it were recalculating, but it wasn't."

Despite the fact that the *pfs:plan* team was in for a harder struggle on the third problem than any other team, its members decided to buck conventional wisdom and not to stay up all night as so many others did. They figured their best chance for success lay in their creativity and financial knowhow, so all three retired quite early Saturday evening for a session of brainstorming and a good night's sleep.

pfs:plan
Software Publishing Corp.
1901 Landings Dr.
Mountain View, CA 94943
(415) 962-8910
List Price: \$140
Requires: 128K RAM, one disk drive.

CIRCLE 763 ON READER SERVICE CARD



The men from 1-2-3, left to right: Adlai Wertman, Walter White, and Mike Crooks.

The 1-2-3 Team

The team assigned to Lotus's popular 1-2-3 had the least computer and finance experience of any team in the event. Mike Crooks, Adlai Wertman, and Walter White were all in their first year at Wharton. Not far into Problem 1, it became apparent that the team had no solid experience with any electronic spreadsheet.

Wertman couldn't really explain why he and his fellow 1-2-3 team members volunteered to enter the competition. "I don't know what we're doing here," he said. "I know it's going to be an uphill battle. I guess if we can manage to learn 1-2-3, we'll have gotten something out of it."

Although the team members struggled all weekend without overcoming their handicaps, none of the members would blame the software. "No, 1-2-3 is great," they responded in unison. "It's fast," said Crooks, "and it has all the functions we might need. I think it's the only thing keeping us from giving up right now. I mean, we were told this was going to be a fun weekend in New York!"

1-2-3, Version 1A
Lotus Development Corp.
161 First St.
Cambridge, MA 02142
(617) 492-7171
List Price: \$495
Requires: 128K RAM, two disk drives, color/graphics card.

CIRCLE 765 ON READER SERVICE CARD

to prevent a disk that is being inserted from catching on the head and damaging it.

Unlike most other drives, the CDC doesn't just let you slide a disk in. You must press it in against the force of a spring, and the disk snaps into place. When you release the disk by twisting the head-loading lever counterclockwise, the spring force is released and the disk pops partly out of the drive—usually about 1 inch—perfect for grasping.

In operation, the CDC drive is eerily quiet. All you can hear is the disk turning inside its slipcover. The head positioning mechanism makes almost no noise at all, even when indexing.

The CDC's mounting scheme is exemplary. Two pairs of holes are drilled and tapped on each side of each drive, and one pair lines up with the holes punched in the PC drive shelf. One drive screws in perfectly at the bottom of the PC drive slot.

Before a pair of drives can be put in, they must be stacked together, and the CDC stacking scheme, which is supplied by Conroy-LaPointe, is the best I've found. A perforated metal sheet mounts atop one drive, using four flat-headed screws (provided) and bolts to the upper drive. Altogether, it's a sturdy one-piece, two-drive package.

Alas, as delivered from Conroy-LaPointe, the CDC drives came with no instructions and were improperly set up for operation in a PC. Both drives had termination resistors mounted and were set as drive 0. After I reset both to drive 1, they functioned more normally. However, some instruction from the vendor would have been appreciated.

My sole reservation about the design of the CDC is the centering ability of its drive hub. It was the only one of the drives tested that had difficulty with a disk that I purposely made as off-center as possible inside its slip case. Although there was an audible snap as I twisted the head-loading lever, I found no damage to the perimeter of the disk's center hole.

Control Data supplies full-height floppy disk drives to IBM for the PC (and the 9428 was the only drive tested that was made in the United States). In itself, that may or may not be a recommendation. However, at the end of my tests, the CDC was the drive I most wanted in my own PC.

3

TEAC FD-55B-01-U

TEACs are among the most popular add-in half-height floppies with users (in fact, they appear in several of the XT's that grace the desks of *PC Magazine* editors) and PC-compatible computer makers. They're inexpensive, widely available, and amazingly compatible.

The mounting scheme supplied is a bit unusual but quite workable. Two pairs of drilled and tapped holes are available on each side of the drive. One set of holes,

however, is tapped metric and the other is SAE (United States). Actually, that's not a major problem. The United States-style holes line up with the holes in the PC's drive shelf. The metric holes, with a suitable mounting kit, allow you to stack two drives as a single unit. I tested a pair of TEACs from PC Connection and another unit by Micro Design International. Both included mounting kits, and the single drive even came with a "Y" cable for easy electrification.

When properly mounted, the TEACs look, at first glance, upside down. The head loading lever is on the right side of the front panel and rotates clockwise to

CHANGING YOUR POWER SUPPLY

To alleviate possible power problems when you use the additional slots freed by half-heights, you should replace the DC supply module.

If you merely plug in a pair of half-heights to replace your current disk drive duo in a PC or your single floppy in an XT, you shouldn't have a care in the world about electricity. In fact, because half-height drives generally have smaller motors than their taller kin, you might even save a few amps by putting a pair in your PC (see sidebar chart).

Nevertheless, you'll probably have power problems when you decide to use that additional slot you've freed up by installing half-height drives. You may not run out of electricity, but you'll be frustrated when you plug in anything else because IBM has only given you two power connectors for drive-slot mounted peripherals. Although you may have enough watts in your power supply, but you don't have any built-in way of getting the juice to your peripherals.

One alternative is to obtain a "Y" adapter cable that branches one power connector into two. However, it's not likely that you'll find such an adapter advertised, and making one is tougher than you'd expect. You'll need the correct connectors, elusive at the retail level, and a special tool to crimp wires to

them and uncrimp them when your efforts go awry. Fortunately, many mail-order dealers offer "Y" cables as part of their drive installation kits.

If you have a plain PC, the solution to the power problem is to replace the whole DC supply module, which is the metal box behind the disk drive that exudes wires. The stock PC power supply is meager at 63.5 watts. Along with more wattage, roughly equivalent to the XT's 130 watts, most replacement power supplies for the PC include one or more extra disk drive-style power connectors already attached. The connectors will solve the problem at hand, and the extra electricity may also help keep underlying electrical shortages from surfacing. (Replacement power supplies are widely available starting at \$120.)

Even if you're not electronically inclined, you have nothing to fear about changing the power supply of your PC. You just unplug and unscrew the old one and then screw in and plug in the new one. You needn't worry about electrocuting yourself because all the danger is sealed inside the metal box.

—W.R.

lower the head. Most of the electronics are then tucked underneath the drive, and the key of the control cable connector is on the opposite side of the drive, as compared to most other units. Interestingly, that reversal made the PC's standard drive cable fit much more neatly in the tight space between the back of the drive and the PC power supply. A design that makes the TEACs a pleasure to install.

A direct-drive pancake motor spins the disk, and a normal band mechanism positions the head. Like the QUME, the TEAC's head-loading lever also controls the small ramp that is raised to protect the read/write head whenever the loading

lever is horizontal and thus allows disks to be inserted.

In operation, a TEAC drive makes a characteristic click every time you send it a command. The noise stems from an extra solenoid designed into the drive to lower the (upper) head into contact with the disk only when DOS calls on the drive. When the drive is idling, the upper head is automatically raised off the disk surface, regardless of the position of the head-loading lever, which is not interlocked.

The addition of this extra solenoid probably won't introduce a delay in disk access because DOS allows time for the disk to come up to speed, anyway. And it

protects the disk from being deformed should you leave one loaded in the drive long enough to fossilize.

4

QUME QUMETRAK 142

The Qumetrak 142 disk drive appears to be a multinational effort by a United States company. The circuit board bears the legend "Made in U.S.A." But the motors were made in Japan, and the label on the back says it was made in Taiwan. Its most notable aspect, however, is that it was IBM's first choice for the PCjr.

The test drive came direct from QUME, so I cannot comment on dealer preparation. If you do buy one (or a pair) that has not been set up by a dealer, you won't have much trouble making it run; you only have to adjust the single header set adjacent to the control cable. If you set the jumper at D51 (identifying the unit as drive 1, per the IBM standard), it will match with your PC.

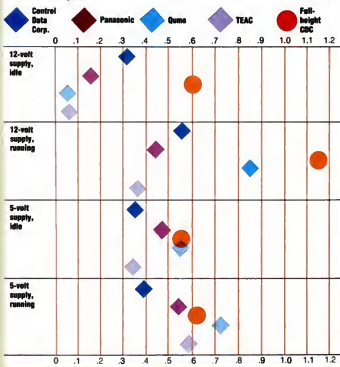
The Qumetrak is designed for mounting in pairs in the PC. The mounting holes do not match those of the PC disk drive shelf. Rather, the mounting holes are inset so that a strap can be used to hold two drives together. This strap would be drilled and tapped for securing the drive pair inside a PC. You'll require such a mounting strap in two-drive systems because the top of the Qume won't support another drive. Without the strap to hold the top drive in place, it settles down directly atop the lower unit, perhaps shorting it out. Unfortunately, the test unit did not include a mounting kit.

A lever on the left of the drive lowers the read/write head. You connect the head-loading lever to a plastic ramp that routes the disk above the read/write head. The head-loading mechanism is also interlocked to prevent you from lowering the upper head without a disk in the drive.

The drive spindle on the Qume is belt-driven, and the metal-band head positioner rotates in the horizontal rather than the vertical plane. The head-positioning motor was buzzy but not unusually so.

POWER DEMAND OF HALF-HEIGHT FLOPPY DRIVES

Measurement in amperes



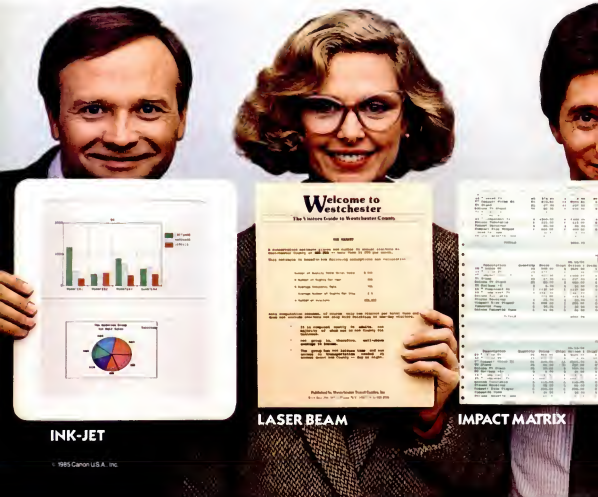
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INK-JET

LASER BEAM

IMPACT MATRIX

Internal cartridge tape drives, some of them half height, offer advanced technology in a small package, allowing you to put backup capability right in your system unit.

AN UP-FRONT APPROACH TO BACKUP

High on the list of abominations blamed on IBM is the marketing of personal computers with 10- and 20-megabyte hard disks without an adequate means of backup. A 3-inch stack of floppies and 2 to 3 hours is more than most people are willing to devote to the task, but IBM leaves you no choice.

For many PC users, IBM's inadequate backup response is the best argument for adding in a more workable system. Several backup alternatives are alluring, but none more so than tape cartridges.

Cartridge tape backup is a well-proven technology with decades of development behind it. The cartridges themselves are convenient and familiar.

Cartridge tape can be fast. Some systems can copy a 10-megabyte hard disk in just a couple of minutes. The latest drives

use serpentine recording (they write to the tape as it travels both forward and backward) so they don't waste time rewinding between backup passes.

Tape cartridges can have huge capacities. Nine-track, 1/4-inch tape transports using 3M Company's DC-600A, 600-foot data cartridges can comfortably hold up to 60 megabytes. The standard DC-300XL cartridge, with 450 feet of tape, holds 45 megabytes. Even the tiny DC-1000A cartridge with 0.150-inch (audiocassette size) tape in a package just 2 inches by 3 inches can pack all 10 megabytes of an XT's hard disk onto its eight tracks.

Tape systems once faced the twin problems of complexity and expense, but the new add-in drives are changing that. Smaller tape drives don't require separate chassis. Manufacturers also are adapting their tape transports to work with the floppy disk controller already resident in your PC, further cutting costs.

Still, tape has some disadvantages. Unlike both hard and soft removable disk systems—which can act as both primary storage and backup—tape is useful only for backing up (and occasionally, data interchange). And tape cartridges force you to deal with yet another medium.

All add-in tape backup units suffer from a power problem: their tape transports require high peak currents. No manufacturer recommends installing one in a PC equipped only with the standard 63.5-watt power supply. While you can often get by with a small auxiliary supply, pow-

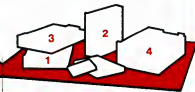
er insufficiencies can be time bombs, often waiting months to go off. The only way to ensure long-term reliability is to replace the PC's internal power supply. Because of this problem, two manufacturers, Mountain Computer and Tecmar, specify their add-in backup units only for the 190-watt AT. To eliminate power as a variable, I performed speed and performance tests using a separate supply for the drive units. Further, to allow direct comparisons of backup speeds without CPU influences, I ran the AT-specified units through a PC (again, with their own isolated power supplies). Performance of the AT units in their preferred home may be better.

1

EVEREX EXCELL 4500

Everex uses standard 1/4-inch tape cartridges in combination with a half-height Wangtek transport to pack 45 to 60 megabytes of backup capacity into your PC.

The Everex controller is a single full-length expansion card connected to the drive with a wide ribbon cable. The cable plugs into the card near the back panel of the PC. In my system, I found this arrangement inconvenient at best. When my IBM disk controller card separated the Everex card from its tape drive, no practical arrangement of the connecting cable



- 1 Everex EXCELL 4500
- 2 Micro Design MT 10
- 3 Mountain Computer FS860-AT
- 4 Sigma Designs STK-45
- 5 Tecmar QIC-60-AT (not shown)

FACE-OFF

Test Objectives

The results of the face-off indicate that there is no one best spreadsheet. Surprised? We weren't. As the designers of face-off problems, we knew that there would be no clear winner. The free-form nature of the event made it impossible to draw fine distinctions among the programs.

However, there was also a hidden objective in developing the problems. We suspected that the event would illustrate that the key to software performance and productivity is really the user's own skills and judgment, rather than any special features of the software itself. Many spreadsheet programs on the market can handle the vast majority of applications quite well, but only if the user knows how to handle the spreadsheet.

The Participants

MicroTrek's role in the Spreadsheet Face-off included designing all the problems, assisting the teams during the event, judging the results of Problem 1 and Problem 2, and coaching the judges of Problem 3. As representatives of MicroTrek, a corporate training and consulting organization, we have a unique vantage point from which to evaluate the results.

The ten spreadsheets were chosen from among today's most popular software and included the spreadsheet components of several integrated packages.

Our test subjects were 29 M.B.A. candidates from The Wharton School of the University of Pennsylvania. Most of the students are majoring in finance or accounting. They were the ideal subjects for this testing, given their strong analytical skills and business backgrounds.

The students were divided into ten teams. One week prior to the contest, each team was assigned a spreadsheet program based on its members' experience with PCs and spreadsheet software. No team was given a package of which its members had more than a cursory knowledge. Most of the students spent very little time working with the software in preparation for the exercises.

The teams were instructed to solve three business problems over a 2-day period. The exercises grew progressively more difficult in terms of both program

skill and business knowledge.

With only three problems and a small sample group, the results would depend primarily on the skill and ingenuity of the teams, not on the software. However, we were less interested in determining "winners" than in analyzing how human skills, nature, and judgment affect the use of any program.

Financial Projections

Problem 1 required the teams to construct a general-purpose financial statement analysis model (see Figure 1). The



students were given a copy of a manually prepared schedule currently used by a large multinational bank to evaluate credit risks. They were told to recreate the schedule with their spreadsheet programs and then analyze the statements of Giant Food, a large food distributor. The time limit was 90 minutes.

The purpose of this problem was to see how the students and the programs would handle a large but relatively simple problem. The programs' more sophisticated features were not used—only basic commands were needed to complete the problem. The key challenge was how well and how quickly the students would learn and adapt to the program's interface. The faster they adapted, the faster they would complete the problem. Of course, the pitfall of speedy completion was the risk of inaccuracy.

The printouts of each team's model were evaluated on the basis of three criteria: accuracy of analysis, speed of completion, and appearance. Judging was relatively easy because the time pressure

apparently caused many teams to construct incorrect formulas in the analysis section of the problem.

The top three teams—*Framework*, *PeachCalc*, and *VisiCalc*—were the only ones that correctly calculated all the financial ratios, working capital, and cash flow. Teams with incorrect answers were eliminated regardless of how quickly they finished or how good their final product looked.

Lease vs. Buy

Problem 2 required the teams to con-

We suspected that the event would illustrate that the key to a spreadsheet's performance is the user's skills and judgment, rather than special features of the software itself.

struct a sophisticated model for analyzing lease vs. purchase decisions (see Figure 2). The teams were instructed to include all tax considerations in the model with the exception of the Investment Tax Credit (ITC). The exercise was designed to test the more advanced features of the programs, especially the financial functions. The level of difficulty in this problem was quite high, and the teams were given 3 hours to complete it.

This exercise required less keyboard action and more reflection and research by the team members than Problem 1 did. It tested their ability to master advanced formulas as well as the programs' documentation of those formulas. All the teams wrote formulas involving advanced financial, logical, Boolean, and, in some cases, table functions.

The printouts of the models were evaluated based on the same criteria as in Problem 1. All of the teams (except *psplan*) completed the problem within the allotted time. Again, time pressure was a significant factor.

tape. Moving the slider back to its original position causes the drive mechanism to slowly release the cartridge. The drive came with mounting rails for AT installation already attached.

The Archive controller occupies the full length of a PC expansion slot. You connect the cable at the end closest to the front of the computer, an arrangement that makes the wide wire ribbon relatively easy

to snake through even a fully stuffed computer. Although specifically designed for the AT, since the controller card attaches only to the 8-bit portion of that computer's 16-bit data bus it's also PC-compatible, if you have the power.

The Archive drive and controller proved a formidable combination, racing through 2.2 megabytes of file-by-file backups in 1 minute, 24 seconds. The

Mountain backup software was too smart to back up blank areas of disk but was happy to stream all of the DOS area of the hard disk that was used, again 2.2 megabytes in 1 minute, 1 second.

Mountain's software is also particularly good. It apparently adapts itself to the memory available in your PC and builds the biggest buffer it can—about 320K in my system—which helps it speed the transfer of data to tape. Although it uses menus that are quite austere, they were effective, easy to understand, and essentially trouble-free. Selective file restorations are easily accomplished (to the current default directory). The software will not, however, make selective restorations of a streamed DOS partition.

A TALE OF TWO PROCESSES

In the battle of tape backup processes, streaming offers raw speed, while start-stop counterattacks with flexibility. The real winners combine them both.

Contrary to popular usage, the terms "cartridge tape" and "streaming tape" are not synonymous. "Cartridge" describes only the medium; "streaming" describes a process of putting data on that medium and is usually contrasted with "start-stop."

Strictly speaking, streaming means running the data from hard disk to a continuously moving ribbon of magnetic tape. The transfer is so fast, no time is available for reorganizing your data. The tape controller does not analyze the meaning of the information or even weed out bytes coming from bad tracks. Rather, bits are read from the hard disk in the exact order they are found on the disk. Because an exact image of the bit pattern on the disk is transferred to the tape, true tape streaming is often called "disk-image" or "mirror-image" backup.

Consequently, many such systems can restore data only in exactly the same way it was pulled off the disk (but backwards). This may require you to restore the data to the same physical disk from which it originated, defeating much of the purpose of making a backup.

Another disadvantage is that streaming is an all-or-nothing affair. You have to dump all the disk's files (often including the blank areas) to the tape. Thus backing up a partly full disk with a streaming drive actually can take longer than using start-stop.

Start-stop tape works just as its name implies it does: the tape starts and stops, usually between files or storage units (blocks). Sometimes, it records a form of directory on the tape so that individual—or groups—of files can be retrieved or so that identification information may be coded as a header to each file or block of stored data. Of course, you may need to search the entire tape to find a particular file. Start-stop allows you to back up or restore individual files, groups of them, directories, or whole disks.

The penalty for start-stop is speed. Reorganizing data for backup takes microprocessor time, and the start-stop motion further slows the backup.

The latest cartridge tape controllers combine the speed of streaming with the file-by-file access of start-stop tape using their built-in intelligence. They stream data to tape but then can go back and digest the data they've stored. They can use the directory streamed from the disks to find any file stored on the tape.

Such systems offer immense benefits. You don't have to restore the world to recover a single file. But there can be a time penalty, too, particularly when you want to randomly restore several files. Random access of the sequential tape medium is so clumsy that restoring a single file can take minutes. Nevertheless, that's probably a lot quicker than trying to reconstruct the lost data.—W.R.

4

SIGMA DESIGNS STK-45

Although the Sigma Designs STK-45 uses a Wangtek, half-height, ½-inch tape cartridge drive, it takes up a full drive slot. Behind the blank lower half of its front-panel bezel resides most of the tape controller. Stuffing the greater part of the electronics under the drive allows Sigma to use a card short enough to fit into the short expansion slot of either the XT or the Portable PC. Alas, the full-height design probably precludes using the STK-45 in either machine—it just won't fit in the Portable and combining it with the XT's full-height Winchester leaves no room for a floppy disk drive. You could pair it with a half-height floppy and half-height Winchester in a PC or put it or a hard drive in an expansion unit from IBM, Sigma, or someone else.

My Winchester has its own chassis, so I put the Sigma in my PC. The installation is elegant. The Sigma comes with enough cable to link the controller to the expansion card, but it was easier to arrange the mass of wire inside the PC when I put the Sigma controller in the space formerly occupied by my IBM floppy disk controller, which I moved one slot over.

The STK-45 definitely requires more power than a standard PC can provide.

Framework again placed first, followed by *Symphony* and *PeachCalc*. None of the answers calculated by the other teams was completely accurate.

Complex Acquisitions

The third and final problem (Figure 3) was open-ended, involving the proposed acquisition of Cola World, a high-flying start-up cola franchiser, by Giant Food—the company the participants had created a financial analysis model for in Problem 1. The teams were told to value the target company, structure the acquisition in the most advantageous way, and support their conclusions in front of the board of directors. Cola World's financial condition and market outlook were based on those of a real company that has since entered bankruptcy proceedings. The teams received the problem at about 4:30 p.m. Saturday, and they had to come up with an answer before 1 p.m. Sunday.

The purpose of Problem 3 was to see how well the students could use the software as an accessory to their decision and thought processes. The exercise was also a test of human nature—the teams were told that their boss thought the target was worth a premium and that he was intent on making the acquisition. Actually, the target company was worth little, if anything. In addition to arriving at the correct conclusion, the teams had to have the courage to stick to their recommendations in front of the panel of judges.

As expected, many teams immediately became bogged down in number crunching and failed to reflect on the problem at hand—a common problem among spreadsheet users. The power of the program made them think that they could answer any question through brute-force computation.

The judges listened to presentations from the ten teams and chose the top three. Once again, the *Framework* team placed first, this time followed by *SuperCalc3* and *Enable*. The *VisiCalc* and *Symphony* teams were the runners-up, but they had errors in their analysis of the cash flows.

Many of the teams came up with rather novel financing ideas. However, most failed to address the unstated but critical question: Should the company make the

Problem 1—Financial Projections

You are a fast-rising young analyst at a major U.S. investment-banking firm. It has recently come to your supervisor's attention that you are a black belt in spreadsheet design. She wants to improve analyst productivity by having you create a general-purpose model for analyzing historical and creating pro-forma financial statements.

The manual form that is currently used to perform analysis is attached. Create a *general-purpose* model in the same or a very similar format.

Your first test of the model will be the financial statements of Giant Food, Inc. Your supervisor wants an analysis of the 1984 results and an income statement projection for the next 3 years, using the following assumptions:

1. Sales growth is 10 percent the first year and 9 percent for the next 2 years.
2. Cost of goods sold are a fixed percentage of sales (73 percent).
3. Interest is 11 percent of borrowings (borrowings remain constant from 1984 onward).
4. Effective tax rate is 44 percent.

Your supervisor also wants to be able to use the model to change the assumptions if necessary. She has no spreadsheet experience.

You have 1½ hours to complete the problem.

Figure 1: This is Problem 1, just as it was given to the 29 test participants. It tested the students' adaptability to their spreadsheet programs.

Problem 2—Lease vs. Buy

Your financial statement analysis model was such a success that your supervisor was promoted, and you got a pat on the back. So you quit the investment bank and are now working for a financial consulting firm.

Your first project is to develop a lease vs. buy model that your firm plans to market to its clients. The model should be capable of analyzing a large variety of potential acquisitions. The decision on whether to lease or buy should be based on the net present value of the relative cash flows with ACRS and depreciation factors taken into account.

Your predecessor tried and failed to come up with a successful model. He left some materials (attached) that you may find useful.

The model should be usable by someone with little spreadsheet experience.

You have 3 hours to complete this problem.

Figure 2: Problem 2, a lease vs. buy exercise, required the test participants to use the advanced financial features of their programs.

Problem 3—A Complex Acquisition

You are employed as an analyst in the mergers and acquisitions unit of Giant Food, a highly successful food-pharmacy retailer with over 100 stores across North America. Giant is on the hunt for juicy takeover targets. Your boss, I.B. Riskeaker, has identified Cola World Corporation as his next victim.

Cola World is in the business of granting licenses to third parties to manufacture and distribute its premium software beverages. I.B. thinks that its business fits nicely into Giant's strategic plan, and he is quite intent on making the acquisition.

I.B. has assigned you to analyze the Cola World acquisition and make the appropriate recommendations. The project can be broken down into the following tasks:

1. Determining the probable acquisition price:

(continues)

Figure 3: Problem 3 involved a complex acquisition plan that tested how well the students had incorporated their program's features into their individual problem-solving processes.

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acquisition at all? Most of the teams that considered this question found that the answer was no.

Many of the teams sidestepped the valuation question to get to the more glamorous job of financing the acquisition—as we expected they would. They accepted the idea that the company was worth a premium without even questioning its true value.

The teams that performed the best did a detailed market analysis based on the consultant's projections. They then derived the probable cash flows under these assumptions and performed a discounted cash flow analysis. The winning teams went one step further and stated that they felt the consultant's assumptions about Cola World were over-optimistic.

Drawing Conclusions

Based on the results of three problems, it would appear that *Framework* has the best spreadsheet, but this is not a valid conclusion. What's clear is that the *Framework* team did the best job with its spreadsheet. Its members approached the problems in an organized, unburied fashion and completed every problem well within the time limit. Their analysis of the acquisition in Problem 3 was strikingly similar to our own.

Some valuable lessons emerged from the participants' and programs' performances. First, a package generally considered to have an extremely weak spreadsheet, *Framework*, placed first in every exercise. (Figure 4 shows the *Framework* team's answer to Problem 2.) *Framework*'s small spreadsheet (4,000–5,000 cells), in outline form, appears to be a very effective tool for organizing a problem and breaking it down into its various components. In contrast to *Framework*'s spreadsheet, Lotus's 1-2-3 contains 500,000 cells, *Symphony* has 2 million, and *The Smart Spreadsheet* has 10 million. Are we being sold huge spreadsheets that are too difficult to organize?

Nine of the ten products tested (all but *pfs:plan*) proved to be quite capable of completing each of the three problems. The second-place finish of *PeachCalc* and the third-place finish of the venerable *VisiCalc* in Problem 1 indicates that good products are not only available now but

(Figure 3, continued)

1.B. believes that Giant will have to pay a substantial premium over book value (at least 20 percent). You are to analyze the financial statements of Cola World and use the data supplied about the beverage market to project Cola World's future performance and determine the premium.

2. Structuring the transaction:

After you determine what Giant should pay for Cola World, I.B. wants you to figure out how to finance the deal. He's given you complete freedom in determining the instrument(s): debt, equity, or some combination of the two. Giant has borrowed in foreign capital markets and is not adverse to doing so again. I.B. is fond of arcane financing techniques but is concerned with keeping a nice-looking GAAP financial statement.

3. Supporting your conclusions:

You must support your decisions with detailed financial analysis. Schedules should be developed detailing your determination of purchase price, and pro-forma financials should be developed for the combined companies.

4. Presentation:

You must analyze this deal quickly and efficiently. You will go before the board of directors tomorrow at 1 p.m. to give a presentation. You should prepare a summary report for the board members to review. Detailed supporting schedules may be necessary. The board is composed of financial heavyweights. They want hard numbers, graphs are for wimps. The board is extremely busy so your presentation is limited to 15 minutes.

LEASE ANALYSIS

A. ENTER THE PERIODIC LEASE PAYMENT	\$35,000.00
B. ENTER THE NUMBER OF PERIODS	6
C. ENTER THE PERIODIC DISCOUNT RATE (EXAMPLE, ENTER 10% AS .10)	15.00%
D. ENTER THE EFFECTIVE TAX RATE	50.00%

NET PRESENT VALUE	(\$76,162.71)

PURCHASE ANALYSIS

A. ENTER THE PURCHASE PRICE	\$250,000.00
B. ENTER THE DOWN PAYMENT PERCENTAGE	20.00%
C. ENTER THE LOAN INTEREST	12.00%
D. ENTER THE LOAN TERM--PERIODS	7
E. ENTER THE EFFECTIVE TAX RATE	50.00%
F. ENTER THE ACRS CATEGORY	2
ENTER 1 FOR 3YR ACRS	
ENTER 2 FOR 5YR ACRS	
ENTER 3 FOR 10YR ACRS	
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Figure 4: The first-place *Framework* team devised this model as an answer to Problem 2.

Embedded-servo floppy drives, quad-density floppy drives, and CD-ROM drives that fit neatly into the slots of your PC are the leading edge in mass storage solutions. In fact, these systems venture beyond Big Blue's official sanction.

NEW FRONTIERS FOR ADD-IN TECHNOLOGY

Add-in expansion through your PC's drive slots allows you to transport your system from the Dark Ages and into Tomorrowland—without waiting for tomorrow. You can add in the latest choices in mass storage devices.

With a quad-density drive, you will not only quadruple the usefulness of every floppy disk, stretching disk space from 360 kilobytes to 1.2 megabytes, but you'll also ensure that your work will be upwardly compatible with the AT (the downward compatibility of which is still regarded somewhat dubiously). AT-written disks may not be readable by an ordinary PC drive, but your add-in quad-density drive will have no problem.

The latest add-ins venture beyond the options and limits officially honored by IBM on the AT and include multimega-

byte, embedded-servo floppy disk drives. As the rough edges get chipped away from this technology and its installed user base climbs, you can count on this device to give you ordinary floppy and AT-compatible floppy capabilities coupled with storage stretching from 2.78 megabytes per disk to a limit of 12 megabytes and more.

For the ultimate in add-in storage, however, you'll want to save space for a CD ROM, a laser-based optical mass storage system that packs hundreds of megabytes

onto a removable, interchangeable, and nearly indestructible silver disk about 4 inches across. While the current model drives don't let you write on the disks, you can read and read and read. One disk can hold the electronic equivalent of several encyclopedia sets. Moreover, your reading can go on and on without end because the laser-locked data is immune to most abuse. Even if you accidentally stomp on one of the little plastic disks, it won't lose a byte. —Winn L. Rosch

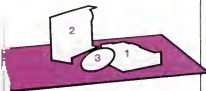
1

BEYOND DOUBLE DENSITY

The humble floppy disk drive has just had a mid-life career change to begin anew as a high-density storage medium. A quad-density drive that can fit into the same slot as a double-sided, double-density, half-height floppy will allow you to pack twice as much data onto your disks. And since quad drives are reasonably priced, they make a practical investment for the typical user who requires extra storage space.

Mounting a quad-density drive in your PC or compatible is just as easy as adding a regular double-density drive. The Tandon TM 65-4, for example, is the same size as a standard half-height drive and uses the same type of power and data cable connec-

tors. After turning the power off and disconnecting the AC cable, you remove the PC's cover and slide the TM 65-4 into an available slot. In any experience, it's best to plug the power cable from the PC's supply (four wires ending in a plastic connector) into the drive before you fasten it down with the side mounting screws. Then you plug one of the ribbon cable connectors from the disk controller board into the board edge connector at the rear of the drive, and you're ready to go. It's that simple. Once you have the Tandon drive running, you'll happily notice that the disk and stepper motors are so quiet that they are almost inaudible in a normal office environment.



- ◆ Tandon TM 65-4 quad-density drive
- ◆ Data Technology TeamMate 1103
- ◆ A compact disk

THE HUMAN FACTOR

By throwing undue emphasis on ultrafeatures and extras, software companies have souped up their spreadsheets, but they've neglected the user.

The Spreadsheet Face-off offers some useful lessons for all those involved in the software industry—users as well as vendors. The most important lesson is that it's time to focus on the key ingredient for the productive use of any program: the skills and abilities of the user.

The media, as well as software-seeking organizations, pay too much attention to feature-by-feature comparisons, as though the sum total of a program's features is an indication of the program's usefulness. So many capable programs are on the market that the microcomputer spreadsheet has practically become a generic product. Each has a unique set of "extras," but these specialized capabilities are irrelevant to the vast majority of spreadsheet users.

Not enough attention is placed on teaching PC users how to integrate this powerful software into their own analytic and decision-making processes. This is not a natural step for most people; they either get caught up in the mechanics of using the program (as did many of the students when they tried to solve Problem 3), or else they ignore the computer completely.

Reliance on the Machine

Although many organizations are now addressing the issue of providing users with rudimentary PC skills, the larger issue of how to promote effective use of spreadsheet tools has been sidestepped. It is not enough to teach users to create formulas, insert rows, and print reports. They must also understand what PCs should and should not be used for. Too often, PC users are trained to use the machine as a tool for generating massive quantities of information, as though printing out large amounts of data were the end rather than the means to a good

decision. More information is not necessarily better—the quality of a decision does not rest on the quantity of the data analyzed.

Organizations must now begin the arduous task of training users to create applications with their software, not just printouts. Users must also be made aware of the potential pitfalls of overreliance on software when making a decision. Training must focus on using the software to derive significant information. This kind of training does not emphasize the features of the particular software—rather, it emphasizes how PC applications can be developed to enhance an organization's information flow and decision-making processes.

The Spreadsheet Face-off can also teach some lessons to those software manufacturers wondering which state-of-the-art superfeature to include in the next release. Instead, software companies would do better to consider how to assist their users in making effective use of the basic features that their software already has.

Addressing the Real Problem

Many vendors are currently addressing this problem by beefing up user hotlines, establishing authorized training centers, improving program documentation, encouraging publication of books and other educational tools, and promoting third-party development of business applications. However, this ad hoc approach will not work; software manufacturers must begin to develop long-term strategies for promoting the effective use of their software. Of course, it would also help if leaders in the software marketplace became less concerned with the latest technology and focused instead on the effective use of existing programs.—R.H. and M.W.

have been available for a long time.

1-2-3 was not among the top three in solving any of the problems. Is this an indication that its reputation is undeserved? We think not. 1-2-3 was deliberately assigned to the team with the least prior PC experience, and, despite its technological disadvantage, the team managed to perform well. The team members thought the program was great.

Problem 2 was as complicated a question as most people ever attempt with their spreadsheets. The fact that nine out of the ten programs were capable of completing the problem indicates that there is not a great difference in the capabilities of most spreadsheets. The super-advanced features that vendors trumpet may not be relevant to most users. The third-place finish of *PeachCalc*, a program with few advanced features, is a case in point.

Much has been said and written about the difficulty of using many spreadsheets. However, the students did not appear to have trouble learning their programs. In a matter of hours, they grasped many of the advanced functions and commands of a completely new piece of software. *Symphony*, for instance, a product that has been criticized by many reviewers for being difficult to use, placed second in Problem 2. Since the team had no previous experience with the package, it appears that *Symphony's* spreadsheet, at least, isn't so difficult to master.

Paralysis of Analysis

During Problem 3, many students stayed up all night at the keyboard when a few hours would have sufficed. This phenomenon is the "paralysis of analysis" to which many spreadsheet fanatics seem prone. A spreadsheet program is often the first—and sometimes the only—software that PC users learn. They become prejudiced by that experience and come to believe that any problem can be solved with a spreadsheet. Above all, the Spreadsheet Face-off demonstrated that no software program is a substitute for clear, logical thinking. ■

Ray Hood and Michael Wilding are officers of MicroTrek Enterprises, Inc., a consulting and training firm in New York.

A quad drive allows for disk capacities of up to 808K when using the ten-sectored quad-density format. Specially formulated disks are available from several manufacturers for use with this 96-tracks-per-inch (TPI) format, but many knowledgeable users insist that a standard single-sided, double-density floppy also gives satisfactory results. During a period of 3 months' use of the Tandon TM 65-4 with both 96 TPI and standard budget-type single-sided, double-density disks, I had trouble with only one disk, which became unreadable after about a week's use.

Since a quad disk has twice as many tracks to format, formatting times take longer. Typical read/write times for quad

disks also take about 50 percent longer than standard floppies. This may keep users from running disk-intensive applications directly from a quad drive.

It is for data storage and hard disk backup that quad drives become especially useful and cost efficient. You can purchase a typical quad drive for about the same price as a regular floppy drive. For archiving, you can purchase a special quad disk for about \$3 each (regular floppies cost \$2). To back up a 10-megabyte hard disk, you need about 12 or 13 quad disks and the time required to process them. At a potential cost of 25 cents per 100K, quad drives can be an efficient resource for small-business users.—Peter Feldmann

hard disk, which packs about five times as much data per unit of surface area as the AT's high-capacity floppies, doesn't struggle against any fundamental barrier to magnetic capacity.

Mechanical Problems

The mechanical limits imposed by the floppy disk drive itself are tougher to break through. To squeeze larger amounts of data onto the surface area of a 5¼-inch floppy disk, you must use smaller and smaller chunks of the medium for storing every bit of data. Finding each ever shrinking bit requires a more precise search. Thus, the precision with which the disk drive itself can pinpoint a single bit becomes the data storage limit.

Given enough ingenuity, time, and resources, there may be no limit to the precision that can be built into a disk drive, but the amount of precision you can afford is another matter entirely. Machines made more precisely simply cost more.

Moreover, the mechanics of the floppy disk itself give the drive its biggest problems. No disk is perfect—not perfectly round, nor flat, nor smooth, nor supple—and even those imperfections literally change with the weather. Environmental factors can warp and distort floppy disks until they wander beyond the disk drive's built-in tolerances.

The embedded-servo technique doesn't eliminate the problems of disk drive precision or make floppy disks more perfect. Instead, it compensates for and adapts to the flaws by keeping both disk and drive under exacting control.

The most important limitation inherent in the traditional floppy disk drive is the means by which its mechanism is controlled. In technical terms, most floppy disk drives use open-loop systems. An actuator moves the read/write head across the surface of the disk. The head (or heads, in double-sided drives) jogs between 40 discrete positions—the tracks or cylinders that concentrically circle the drive hub.

When the head-positioning mechanism moves the read/write head, it can only approximate the right location for each track. It never knows whether it has placed the head at exactly the right point. It has no way of monitoring where the head is in relation to the tracks on the disk.

2

EMBEDDED SERVO MAKES FLOPPIES SENSIBLE

No one speaks kindly of floppy disks. I've never heard anyone utter the words, "Floppy disks are wonderful." Worse than their sluggish performance is their capacity—you need an awfully tall stack of them to amount to anything.

However, the application of a proven hard disk—controlling scheme to floppy disks may just change the way you think about the flexible 5¼-inch wonders. Called "embedded-servo" technology, this scheme can pack multiple megabytes onto a single floppy disk that looks no different from those already in your PC's drive slot.

Several years ago, Drivetec, Inc., designed commercial floppy drives using embedded-servo techniques, pushing floppy capacity to 3.3 megabytes unformatted and 2.78 megabytes formatted. In

1983, Kodak began to manufacture the same drive under license as the Kodak 3.3. The Kodak drive, packaged with everything you need to install it in a PC drive slot—a special disk controller, cables, hardware, high-speed backup software, and installation instructions—is currently available to consumers from the TeamMate arm of Data Technology Corporation (DTC) as the model 1103.

But 3 megabytes per floppy disk is just the start. Drivetec has shown a 6-megabyte version of its drive, and rumors of a 12-megabyte version by this time next year are rampant. With a potential capacity rivaling that of many Winchester hard disks and a media cost less than that of a streaming tape cartridge, the floppy disk suddenly becomes a painless backup medium, as well as a workable primary storage system in itself.

Although greater floppy disk storage capacities such as the 1.2-megabyte PC AT floppy disk drive may require special disks with high-quality magnetic surfaces, the real limit of the capacity of floppy disks is not so much the magnetic medium as the mechanism that runs it. The storage densities of today's best magnetic surfaces far outreach the pretenses of even quad-density disks. Even the typical Winchester



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Just as when you close your eyes and try to touch your fingertips at arm's length, the positioner sometimes succeeds in touching the right spot and sometimes it fails. When you miss your fingertips, you laugh at how difficult something so simple can be. When the drive misses, you get a "Data Error Reading Drive A:" (or B: or C:) and curse at how stupid and unreliable machines are.

With 40 tracks per disk (48 tracks per inch of disk radius; only $\frac{3}{8}$ inch of the radius is used for storage), such open-loop systems work well enough for the personal computing world to depend on the floppy disk as its primary mass-storage medium. Even at 96 tracks per inch, the open-loop system has proven acceptable—in the AT for example. But when that number is doubled to boost disk capacity still further, the state-of-the-art open-loop mechanism falls apart. The error rate climbs so high that the system may become too unreliable to be useful.

Closing the Loop

The alternative to the open-loop system is the closed-loop or servo-controlled system. The loop is closed by feedback—some form of sensor that sends or feeds data back to the positioning mechanism, telling it exactly where the read/write head is. Such a head positioner is a servomechanism that constantly adjusts itself in accordance with the information fed back to it.

Many high-capacity hard disk systems—and now the Drivetec and Kodak floppy systems—use a particular form of closed-loop positioning system called embedded servo. The mechanism determines the head's location by detecting "servo bursts" that, in the Kodak and Drivetec systems, are specially recorded in between (or embedded in) data tracks at a location corresponding to the end of each sector of each track on the disk.

If the head is properly positioned directly on the data and exactly in between the two servo bursts that straddle each track, then the signals produced by each of the two bursts will be of equal strength. If the head varies in its concentric path, one burst will produce a stronger signal than the other, and the servomechanism moves the head toward the weaker signal.

Through the use of this control scheme, the position of the read/write head can be controlled to within $\frac{1}{10,000}$ of an inch, tight enough for multimegabyte floppy capacities.

One shortcoming of the embedded-servo system used by the Drivetec and Kodak drives is that the servo bursts must be precisely recorded, and the drives themselves are not accurate enough to write the nec-

The Kodak 3.3 drive used in the TeamMate 1103 appears to be a work of elegant simplicity. You see few of the springs, cams, and levers of normal half-height floppy drives.

essary bursts in the required precise positions. Hence, all disks they use must have the servo information written on them at the factory before they are sold.

Although the recording of these servo bursts is different from formatting the disk (new Kodak disks must be formatted with the standard DOS FORMAT program before use on the TeamMate system), the need for the factory-recorded signals is much akin to requiring you to buy preformatted disks. It restricts the source of supply (although TeamMate claims that compatible servo-written disks are available from a number of manufacturers) and makes the disks somewhat more expensive and more vulnerable to magnetic damage. A stray magnetic field can render a Kodak 3.3-style embedded-servo disk totally useless. Moreover, if you format a Kodak 3.3-style disk as a standard double-sided double-density disk, you can never go back and use it for its higher storage capacity.

An Elegant Drive

The Kodak 3.3 drive used in the TeamMate 1103 appears to be a work of elegant simplicity. You see few of the multitude of

springs, cams, and levers of normal half-height floppy drives. The bottom is a single large circuit board. The top is covered with a precision-cast, glass-filled plastic frame. The chassis of the drive itself is a sturdy aluminum casting.

The drive mechanism itself embodies some clever technical innovations. The typical floppy disk drive uses a single stepper motor that pushes and pulls a metal band to position its read/write heads. The Kodak drive uses two motors, one for coarse positioning (which essentially operates under open-loop control) and one for fine positioning (which is controlled by the embedded-servo information). The coarse-positioning motor drives a lead screw to move the head. The fine-positioning motor uses a lead screw to move a lever for fine-tuning the head with five times the accuracy of the coarse motor.

One sore spot in all floppy disk drives is the mechanism used for centering the disk. In most designs, the centering hub is mounted on a hinged or pivoting arm. Consequently, the hub engages the disk at a slight angle. The plastic top frame of the Kodak 3.3 drive holds a spiral-screw plunger to carry the hub for centering the floppy. The plunger goes straight up and down so accurately (at least according to its makers) that hub-ring reinforcement of the disk is unnecessary. In fact, none of the Kodak 3.3 disks I was supplied with had reinforced center holes.

Atypical Loading

The unusual hub mechanism makes loading and unloading disks into the TeamMate drive also a bit unusual. First, you slide the disk into the drive slot; then to lock the disk in its slot, you must push a small lever to the right until it disappears into the front panel of the drive.

Once the disk is properly loaded, you access it for reading and writing by using all the standard DOS commands. The drive noisily jumps to life as the upper read/write head drops against the disk (often called "head loading") and indexes. Immediately the brightest drive-activity light in all creation bathes your computer room with its warm red glow. Then, when your computer is finished accessing the disk, the light goes out, and the drive stops spinning a couple of seconds later.



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Earlier versions of the Kodak/TeamMate system kept the disk twirling all the time it was in the machine. When I questioned TeamMate about disk wear, a company spokesman assured me that wear was not a problem. The drive uses special "gumball" heads with a spherical surface instead of the flat-faced heads used on most floppies. The gentle curve of the gumballs puts less stress on the disk when it drags between them.

Skeptical, I tried my own test and left a disk spinning in the machine for 3 weeks, roughly 18 hours a day. I had to end my experiment not because of undue wear of the disk but because a bearing in the disk drive itself began making ominous, worn-out sounds. (According to TeamMate, such a problem had never before been encountered in a Kodak drive.)

Although the current version of the Kodak 3.3 drive halts the disk's spin if the head is loaded and the drive is not busy for about 2 seconds, if a disk is in the drive and the head is not loaded, the motor will merrily spin away until you remove the disk.

To retrieve a disk from the machine, you must press a small button on the bottom right of the front panel. (Remember, the lever you used to lock the disk in place has disappeared into the machine.) Although clever, this release mechanism proved troublesome. In its current form, it will not let you get at your disk until it stops spinning, even after the drive light is out. I found this restriction a minor frustration. Also, I discovered that applying only moderate force to the front mounting screw of the drive causes the release button to bind in its pushed-in position. I had to mount the drive somewhat loosely to make it work properly.

When you install the Kodak 3.3 drive, you'll immediately notice that it measures about 1/2 inch longer than most floppy drives. Consequently, it sticks about 1/2 inch further out from the front panel once it is installed. TeamMate supplies a half-height plastic bezel that mates with the Kodak drive to give your installation a factory-finished look.

Disk Control

The disk drive itself is only half the hardware you need in a mass storage sys-

tem; you also require a controller. Because of its novel servo-control system, the TeamMate drive uses a special disk controller.

The TeamMate floppy controller, an expansion card about two-thirds the length of a normal PC slot, can be used in conjunction with a standard IBM floppy disk adapter or in lieu of the IBM product. When used with the IBM adapter, the IBM

When you replace your standard disk drive with a TeamMate 1103, you won't lose any capabilities. The TeamMate can even read ordinary DOS double density disks.

card controls the standard floppies in the system and the DTC handles the Kodak drive(s). When the DTC controller is in full command, it can operate up to four drives, both standard floppies and Kodak drives in any combination. Although the DTC can mimic the normal functions of the IBM controller, it's not a perfect mime and may prove incompatible with some copy-protection schemes.

Replacing an IBM controller with the DTC unit may require that you make minor modifications to your normal disk drive(s), such as changing jumper wires. An accompanying TeamMate manual gives step-by-step instructions for the whole installation process.

When you replace a standard disk drive with a TeamMate 1103 in your system, you won't lose any of the capabilities you had before. The TeamMate can swallow its pride and, like the quad-density AT disk drives, lower its aspirations to read ordinary DOS double-density disks. Like the AT's high-density drive, however, when it writes disks in its double-density mode, a standard disk drive will likely be unable to read them.

TeamMate also plans to release a ver-

sion of the Kodak 3.3 drive compatible with AT quad-density disks. One drive will then be capable of reading any standard IBM format from 160 kilobytes to 2.78 megabytes per 5 1/4-inch floppy disk.

Because a Kodak-style disk packs more data into each turn it takes, the TeamMate system theoretically doubles the standard IBM floppy disk data-transfer rate to 500 kilobits per second. When running standard double-density disks, the TeamMate drive spins up to double the speed of the IBM, 600 revolutions per minute, and should pump data out of disks twice as fast.

The increased speed should make data transfers from the Kodak drive twice as fast as from a standard floppy drive. Alas, real-world performance never agrees with the spec sheets, and the TeamMate system's is no exception. In my time trials, the 1130 proved no faster than an ordinary floppy. According to TeamMate, DOS causes the slowdown.

To make up for the lackadaisical, ordinary floppy disk performance, TeamMate includes a special high-speed backup program (appropriately called BakUp) with the system. In theory, the program will zip through backups to floppy disks about three times faster than the utilities built into DOS. Because I did not receive a copy of the program, I was not able to verify that rating.

Drive Identity

A single TeamMate 1103 actually appears as two distinct drives to your system. The 2.78-megabyte-capacity embedded-servo drive appears as drive C: to DOS. The same Kodak drive appears to your computer system as B: and is PC-disk-compatible, able to run any double-density DOS-formatted disk. If you keep track of the type of disk you have in the TeamMate, use the proper drive letter to access it, and everything will work as it should.

But make a mistake, and suddenly you're playing data roulette. Leave the embedded-servo disk in and call for drive B: and you get the infamous "Abort, Retry or Ignore" error message. No problem, just call up drive C:, you say. But no, the message pops up all over again, even

THE PIVOT PORTABLE

than the more costly DATA GENER-AL/One.

NewWord, the word processor bundled with the Pivot, is a take-it-or-leave-it sort of program. If you know and are satisfied

with *WordStar*, you'll be quite happy with *NewWord*, which has some added functionality beyond the basic version of *WordStar* and a very similar command set. Otherwise you'll be looking for other

word processing software. Which brings us to the question, how compatible is the Pivot?

The answer is, somewhat compatible. It runs certain programs without a hitch, including *WordStar* and Lotus's 1-2-3; in fact, the Pivot comes with instructions for running 1-2-3 to make sure you have no problem. It also runs *Multiplan* and *pfs:write*. However, it won't run *WordPerfect*, *DisplayWrite 2*, *Framework*, or *Intuit*. You can boot PC-DOS, although Morrow advises against it since certain functions, like the RAMdisk, won't work. In general, it seems hard to predict what will run and what won't.

Where does this leave you? Obviously, if you have a favorite program or programs

Pivot is somewhat PC compatible. It runs certain programs without a hitch, including *WordStar* and Lotus's 1-2-3. In general, however, it seems hard to predict what will run and what won't.

that you must run on your portable, you would be well advised to test them on the Pivot before buying. Morrow is certainly being candid—the company is not claiming 100 percent compatibility but is simply saying that the Pivot will run many IBM programs. However, the burden to verify any software beyond the programs that Morrow has tested is on you.

Pivot's Modem

Pivot's built-in modem is a direct-connect, auto-dial modem. It is easy to set up and proved reliable in operation. To use it you will need to buy a duplex jack and some telephone cable with the standard RJ11-C connectors (the modular connectors you probably have on your phone). The built-in communications software is perfectly straightforward and functional and includes a built-in timer that will keep track of your calls as well as provide sup-



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THE PIVOT PORTABLE

port for tone or pulse dialing.

However, the modem/software combination has a couple of drawbacks which detract from their usefulness. You can't send or receive disk files with the built-in

modem software, and you can't use it as an auto-answer system. If you need these capabilities or high-speed transmission, you'll have to get additional communications software and/or an external modem.

The manual does indicate that Morrow might provide disk-based software to support file transfers at a later date, but for now, this is what you get.

Documentation

The documentation that accompanies the Pivot includes the owner's handbook, a

The owner's handbook is well done in every respect—the graphics are attractive and well executed, the drawings are clear and plentiful, and the copy is thorough and clear without being condescending.

very hefty *NewWord* user's guide, a not-so-hefty *NewWord* supplement, and three MicroSoft MS-DOS manuals: a user's guide, programmers' reference, and a DEBUG pamphlet. There are also a few additional typewritten sheets that cover corrections to the owner's handbook and the installation procedure for using 1-2-3 on the Pivot.

The owner's handbook is well done in every respect—the graphics are attractive and well executed, the drawings are clear and plentiful, and the copy is thorough and easy to understand without being condescending. It may not be the greatest literature in the world, but it will probably keep you interested while you learn about the Pivot. It is definitely a cut above most documentation.

Another matter worth noting if you are considering buying the Pivot is that Morrow is planning to release a 25-line version after July 15. The machine will retain the same plastic housing but will be substantially redesigned inside to provide "100% IBM compatibility."

In order not to leave 16-line Pivot owners with obsolete machines, Morrow is offering a trade-up policy: if you buy a 16-line Pivot now, you will be able to return it after July 15 with \$1,000 for the new 25-line model.

(continued)

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Other Contenders

Sony is not alone, of course, in introducing CD-ROM products. Hitachi has a standalone unit (See "Power Promises for PCs" PC, Volume 4 Number 4, page 33), and it promises a PC plug-in version by the end of March. Moreover, Philips introduced its own standalone model at the Winter COMDEX, and other manufacturers can be expected to join the competition.

Further down the line are units able to write to as well as read from CDs. Again, emphasizing the CD's audio heritage, Nakamichi manufactures the only current read/write recorder that is available commercially.

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OmniTel's Encore Performance

The Encore 1200B, Omnitel's new and well-designed internal modem, features true Hayes compatibility.



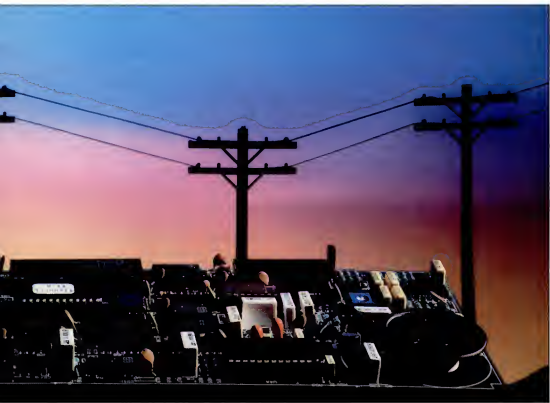
Given all the Hayes-compatible, 300/1200 baud, autodial, auto-answer modems on the market, it's hard to get excited over yet another one. But there is always room in the marketplace for a well-designed, low-cost product, particularly if it offers something beyond a "me-too" approach. The OmniTel Encore 1200B is trying hard to do just that.

True Hayes compatibility is an accomplishment itself. The Hayes 300, 1200, and 1200B Smartmodems all share the same on-board firmware—a simple program on a chip. This built-in intelligence lets you send commands to the modem by either typing them at your keyboard or using software to send the proper commands at the proper times.

The Hayes command set has become the de facto standard for intelligent modems and the communica-

tions programs that control them. Hayes compatibility typically means that a given modem uses the Hayes command set, more or less; some Hayes-compatible modems are more compatible than others. Most so-called Hayes compatibles don't have all the functions that you find on the Hayes. Others, which don't even share all the same commands for the functions they do have, can still claim Hayes compatibility because they share the most common commands. At least, they use the same commands for dialing and hanging up the phone.

An additional complication is that though a modem can share the full Hayes command set, minor design differences can still keep it from being completely Hayes compatible. Because of this, many "Hayes-compatible" modems will not work with *Smartcom II*, Hayes's communications program.



The Encore 1200B appears to be fully Hayes compatible, or very close to it. Actually, the 1200B comes in two versions: the T1200-PC1 and T1200-PC1C. The T1200-PC1, which is reviewed here, is exactly equivalent to the Hayes Smartmodem 1200B. Its compatibility is so close that the Encore manual even includes the Hayes requirement for using uppercase only for the attention code that starts each command.

According to OmniTel, the Encore 1200B shares the complete set of Smartmodem commands, including all 19 basic commands and all 16 register settings; a random sampling bore this out. OmniTel also claims that the modem works with *Smartcom II*; a quick test appeared to bear this assertion out. As far as I could ascertain, it also works with several other programs, including *PC-Talk III* and *Omni-term 2*, without special coaching.

All that may be beside the point, however. OmniTel ships the Encore 1200B with *Crosstalk XVI*, the current release of one of the more sophisticated communications programs available—and one that you're not likely to outgrow. The program disk even comes with a bonus—a modified version of *Crosstalk* for the PCjr.

The Encore 1200B itself is a Bell 103/212A modem, meaning that it uses the Bell 103 communications protocol for talking to other modems at 300 baud and the Bell 212A protocol at 1200 baud.

Like the Hayes 1200B, the Encore 1200B is an internal modem. Installing it is no different from installing a graphics card or multifunction board. You simply remove the cover from your PC and slip the modem into one of the empty slots on the motherboard. All that remains is to

connect the modem to the phone line by plugging one end of a phone cable into the modem's modular connector and the other into a telephone wall jack. OmniTel supplies a modular-plug phone cord with the modem. You'll also find a second female modular jack on the modem, so you can plug in a phone.

Like most modems, the Encore 1200B includes several electrical jumpers and a bank of two-position DIP switches that you can use to set various options. These

The Encore 1200B comes as part of a complete communications package. Crosstalk, an integral part of that package, lets OmniTel come extremely close to the ideal of plug-in and go.

come preset for use with *Crosstalk XVI*, and you will probably not need to bother with them. However, there is one setting in particular that you may have to change.

As shipped, the Encore 1200B comes set for COM1. However, if you already have a serial port in your PC with a multifunction card or communications card installed, the odds are that it too is set as COM1. In that case, you'll have to reset the DIP switches on the Encore to tell the modem that it is COM2. OmniTel goes one step further and gives you the option of setting the Encore modem for COM3 or COM4, which is only helpful for the Columbia 1600 and the Zenith 150 and 160 on which COM1 and COM2 are already taken by their two serial ports.

Easy Operation

Once you get the Encore 1200B installed, getting started is unusually simple thanks to *Crosstalk XVI*'s NEWUSER script file. The easiest way to use *Crosstalk* is to create individual command files that contain the proper communications settings and other information for calling a particular system. Actually, *Crosstalk*'s NEWUSER does this for you. It asks you

for essential information like the phone number to call, the baud rate, and the name to store the file under, then creates the file for you. Calling another system then becomes a matter of loading the appropriate command file and telling *Crosstalk* to do its stuff.

Though the ease of use has more to do with *Crosstalk XVI* than with the Encore 1200B itself, the point is that the modem is marketed as part of a complete communications package. *Crosstalk* is an integral part of that package and lets OmniTel come extremely close to the ideal of plug-in and go.

A Manual Within a Manual

The integration of modem and communications program extends even to such niceties as having a single manual, which does a fairly good job of telling you what you need to know in the order you need to know it. The first 15 pages cover the modem and how to install it; the rest is a reprint of the *Crosstalk XVI* manual. This structure makes sense because once you install the modem, you need to communicate with it through the software.

Unfortunately, the manual does contain some oversights. One is that there is no list of the modem's commands or capabilities. Though this list is something many users can do without, particularly if they stay with *Crosstalk*, it is useful to have a list of commands to refer to if you want to fine-tune the settings.

Another problem is that the level of the technical writing is uneven. On the one hand, the manual takes pains to point out the obvious, for instance, that some components on the modem board can be damaged by static electricity. In its step-by-step instructions it includes such basics as "retain the screw that you remove, as it will be used later."

On the other hand, the manual assumes you know what COM1 and COM2 mean, not to mention such communications-specific jargon as Data Terminal Ready (DTR), Carrier Detect (CD), and Data Set Ready (DSR). DTR, CD, and DSR refer to specific electrical lines in communications ports. Some communications programs, including *Crosstalk*, use one or more of these lines to control the modem. Data Terminal Ready, for example, can be



Encore 1200B

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used to tell the modem when the PC is on and ready. Unless *Crosstalk* is loaded and set for auto-answer, the DTR line is off. This state tells the modem that the terminal isn't ready, and that the modem shouldn't answer the phone.

Many programs don't use these lines, however, and if you switch to a program that doesn't, you'll have to reset the DIP switches so that the modem will ignore the lines. With Data Terminal Ready, you have to "force DTR on." This phrase translates to setting the modem so it treats the DTR line as if the terminal is always on and ready. None of this jargon is explained in the manual.

In all fairness, most users will never need to know it since the DIP switches come set to work with *Crosstalk*, and that will generally be enough. Still, the manual carefully explains where the DIP switches are and how to reset them. It would be nice if it took the space to explain the jargon as well.

OmniTel says it is currently rewriting the manual, and the new version will add most or all of the missing information. In the meantime, you'll need to get a copy of the Hayes manual if you want to understand the command set on the Encore.

On the Air

If you have an early version of the modem, you may find that you unwittingly bought an AM radio along with an internal modem. The Encore 1200B has a speaker that lets you listen to a phone call. You'll usually want to set the modem so that the speaker turns on when the modem gets a command to dial and turns off once communications are established. When the speaker first turns on, what you should hear is a dial tone; what you may hear is an AM radio station. It turns out that the modem has a circuit resonant at 1310 kilohertz, right in the middle of the AM broadcast band. If you're close enough to a radio station, you'll pick it up.

Though the first modem sent for review had this problem, the additional noise from the radio didn't result in any increase in communications errors. The modem worked fine with text file transfers on MCI mail and with Xmodem protocol transfers on a local bulletin board. This result says a great deal about the Encore 1200B's superior

ability to slough off noise-induced errors.

Fortunately, the AM radio "feature" is a minor problem that is easily fixed. OmniTel has tracked down the guilty circuit and has solved the problem. If you have an early version of the modem, the fix is available at no charge.

OmniTel's Other Modems

The Encore 1200B is part of a full line of modems from OmniTel. Even the 1200B itself gives you a choice: while the T1200-PC1—the version reviewed here—is intended as an exact counterpart of the Hayes Smartmodem 1200B, its sibling, the T1200-PC1C, is not quite an identical twin since it has a second communications port. The addition gives you an internal modem plus a serial port on the same board—two functions in a single slot. You can plug in a serial printer or another modem at the second communications port. Either port on the dual-purpose board can be set for COM1, COM2, COM3, or COM4.

An external 300/1200 baud modem by OmniTel is also Hayes compatible and can toggle between Hayes mode and OmniTel's own command set. According to OmniTel, its own command set has some advantages over the Hayes commands and offers some extra features.

Other models included an external 300-baud modem, an internal 300-baud modem for the PC, and an internal 300-baud modem for the PCjr—remember that modified version of *Crosstalk XVI* for the PCjr!

About the only thing that's missing from OmniTel's current line is a 2,400-bits-per-second (bps) modem. This new class of modem sends information at 240 characters per second, using a relatively new protocol called V.22 bis. According to OmniTel, the company is working on a 2,400-bps modem. However, since even the new 2,400-bps Hayes modem isn't fully compatible with the old Hayes command set, OmniTel is waiting for the dust to settle before making its final design decisions.

It will be interesting to see what OmniTel finally comes up with. Judging by the Encore 1200B, this is a company to take seriously. ■

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SOFTWARE FOR HARD DECISIONS

It's your decision—and Decision Aide and Expert Choice, two new support programs, can help you define your problems, weigh your alternatives, and, ideally, make your selection.

How many nights have you tossed and turned, unable to silence the little voices in your brain? You just can't stop reviewing the arguments for and against a certain decision. After a night like that, you may be ready to trust your intuition and take a blind stab at the answer, just so you can get a good night's sleep.

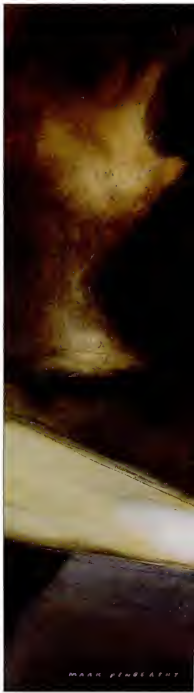
Or perhaps you'll be ready for a bit of computerized help from your microcomputer. Two new software packages, *Decision Aide* from Kepner-Tregoe and *Expert Choice* from Decision Support Software, offer welcome help to the weary decision maker by presenting a systematic approach to the often confusing decision-making process.

Both programs break down a decision into its component parts and ask you to analyze the parts before you reach a conclusion. This analysis eventually leads to a numerical score for each of your proposed alternatives, giving you a rough, quantitative idea of how well each alternative meets your goals. But the way each program guides you through this process is very different.

Decision Aide from Kepner-Tregoe, Inc., an international management consulting firm based in Princeton, New Jersey, is essentially an electronic workbook for Kepner-Tregoe's decision-making method called "decision analysis." This technique, developed by the firm's founders, social scientists Charles Kepner and Benjamin Tregoe, is a key part of the firm's "rational management" program taught at large corporations throughout the world.

Managers who already know how to use Kepner-Tregoe's decision-analysis technique will probably have the easiest time understanding *Decision Aide*, although the manual does teach the basics of the technique and includes a sample decision exercise to get you started.

As Kepner and Tregoe explain in their book, *The New Rational Manager* (Princeton Research Press, Princeton, N.J., 1981), decision analysis has five main steps. The first step is preparing a "decision statement"—for example, "Hire new vice president of research and development"—that expresses an action and the intended results of that action. The



The program automatically rennumbers all topics and list items. *MaxThink* doesn't have the power of a full-blown text editor, but it does very nicely.

Brainstorm Commands

The brainstorm commands mainly help you to organize lists. The Prioritize command lets you go through a list and order the items in ascending or descending

order. For example, to reorder the list of countries in Figure 1 by population, you use the Prioritize command and then enter each country's item number in the order of its population size. As you enter each number, that item disappears from the screen and the countries that are left. When you finish, the list reappears in either ascending or descending order.

MaxThink can also sort alphabetically or by ASCII number or by either of these methods in reverse; it will even randomize the order of a list.

The Levelize command reverses the Binsort command. You use it to move list items up to the same hierarchical level as their topic. In addition, the program allows you to indicate how much of the outline and how deep into the hierarchy you want to level list items. Thus, with one command, you can turn a complex, multileveled outline into one long list. The topic names are still present, but they are reduced to simple items on the list along with everything else.

The Divide command is useful if you want to take a lengthy list item and turn its contents into several different items in the same list. You might, for example, have a two-paragraph chunk of text as an item in a list and realize that you should have divided its contents into separate items. With the Divide command, you can turn every word, line, sentence, or paragraph into a new item. The Join command works the same way, but in reverse in order to consolidate list items.

Other Nice Touches

MaxThink offers a rapid data entry mode that lets you execute commands without wading through the usual series of prompts to determine command options. For instance, the Sort commands ask you how much of the outline to sort, what kind of sort you want, what order to sort in, and so forth. When you turn on the rapid data entry mode, you don't have to answer those questions because *MaxThink* takes the default value for each option.

The default values are preset, however, if you're really ambitious, you do have the ability to change them. *MaxThink* comes with its own programming language, called TPL, that you can use to modify commands, build new command menus and help screens, write command macros, and design interactive *MaxThink* sessions. TPL can loop and branch, test for values, and execute subroutines. The "Maxfolk" must not expect many people to use TPL, though, because you have to send away for the programming manual, which may be just as well since the TPL manual is awful.

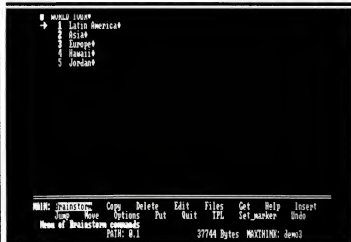


Figure 3: Here's an example of the bin names in the *MaxThink* outline process.



Figure 4: *MaxThink* allows you to look into only one bin at a time.

DECISION MAKERS

second step is to establish objectives. In the case of hiring a new executive, objectives would be phrased as qualities of an ideal candidate for the job. A key part of this step is classifying the objectives into "musts" and "wants." A "must" objective is a measurable mandatory element (such as "2 years' supervisory experience"). "Want" objectives need not be measurable ("interacts well with managers at all levels"). Finally, you give each "want" a score showing its relative importance. This score is called the "weight" of the objective.

Step 3 involves generating and evaluating alternatives. Here you list possible courses of action and then grade them on how well they meet the objectives. The alternatives that fail the "must" objectives are eliminated from further consideration. You give each remaining alternative a numerical score that shows how well it meets each "want." You can then multiply each score by the weight of the objective and add the products together to give a composite score.

Considering Consequences

Instead of merely choosing the alternative with the highest score, Kepner and Tregoe have you go through one more step. They ask you to think of everything

that could possibly go wrong with each of the alternatives, then have you rank each adverse consequence on the basis of probability (high, medium, or low) and seriousness (high, medium, or low). Finally, according to Kepner and Tregoe, you're now ready to make a balanced choice that takes into account how well each alterna-

At each step, Decision Aide offers help if you're stuck. For instance, when you generate alternatives, the program asks a series of questions to help you brainstorm.

tive meets your objectives and how much risk it entails.

Decision Aide leads you through the steps of decision analysis, coaching you along the way as you answer questions about your decision statement, your objectives, and your alternatives. *Decision Aide's* main menu (see Figure 1) presents the system in outline form. It depicts the decision-making process as a circular path with eight steps: planning the decision, stating the decision, establishing objectives, generating alternatives, evaluating alternatives, assessing adverse consequences, making a balanced choice, and printing a report.

At each step, the program asks you a series of questions and offers help if you're stuck. For instance, when you're generating alternatives, *Decision Aide* asks a series of questions to help you brainstorm. Some are straightforward ("What ideas would your employees suggest?"), and some are whimsical ("What ideas would Shakespeare suggest?"). The point is to prod your imagination. If you want help, for instance, in thinking up adverse consequences, *Decision Aide* can ask questions to help you figure out what could go wrong.

When it comes time to multiply the weight of each objective by the score of each alternative, *Decision Aide* does the arithmetic for you and sorts the alterna-

tives so you can easily see which one has the highest score.

In addition to providing worksheets for decision analysis, *Decision Aide* produces a final report that summarizes your goals, alternatives, the possible adverse consequences, and the course of action you've chosen. If you're the lone user of decision-analysis techniques in your organization, you might have to explain the method and jargon to your coworkers.

Design Flaws

If you like using Kepner-Tregoe decision analysis, you'll probably like *Decision Aide*. Still, the program has a few problems. Some are outright bugs, and some are design flaws. None destroys the program's usefulness, but they can get in your way.

One design flaw becomes apparent when you first start *Decision Aide*. Before getting down to business, the program asks a few preliminary questions (see Figure 2). Unfortunately, once you answer these questions and move on to the main menu, you can't come back. If you decide to switch printers, send your report to a disk file, or work on a different decision, you have to exit the program and start it up again to get back to this preliminary screen.

Another design flaw appears in the first *Decision Aide* step, "planning the decision." In this step, the program asks a series of questions about the situation, and one of these questions leads you into an unexpected dead end. It asks innocently, "Does this situation require problem analysis?"

If you answer yes, *Decision Aide* tells you that although problem analysis is a good idea, the program is not designed to handle it, and then it instructs you to sign off and complete the problem analysis before continuing to use *Decision Aide*.

The manual doesn't offer much help. It mentions problem analysis as a technique "for those situations where something has gone wrong and you don't know why," but it doesn't explain how you are to go about it.

The version of *Decision Aide* I reviewed had some other bugs as well. For instance, when I tried to print a *Decision Aide* report on a serial printer, the printer



Decision Aide, Version 1.0

Kepner-Tregoe, Inc.
P.O. Box 704
Princeton, NJ 08542
(800) 223-0482
(609) 921-2806
List Price: \$250

Requires: 128K RAM, DOS 2.x, two double-sided disk drives or one disk drive and a hard disk.

CIRCLE 800 ON READER SERVICE CARD

Expert Choice

Decision Support Software, Inc.
1300 Vincent Place
McLean, VA 22101
(703) 442-7900
List Price: \$495

Requires: 128K RAM, DOS 2.x, one double-sided disk drive.

CIRCLE 799 ON READER SERVICE CARD

didn't advance the paper at the end of each line. Although the configuration screen has a linefeed parameter, the program wouldn't accept alterations in the parameter. Ultimately, I was able to fix the problem by flipping a switch on my printer that added a linefeed to each line that it received.

These problems are irritating, but none of them is catastrophic. *Decision Aide* can still be a useful tool, especially for organizations that already use the Kepner-Tregoe techniques.

No Hand-holding

Decision makers can get a different style of computer-based help with *Expert Choice* from Decision Support Software, Inc. Like *Decision Aide*, this program presents a structured approach to decision making—but *Expert Choice* doesn't take you by the hand, help you phrase your decision statement, prod your imagination, or remind you to consider adverse consequences—it assumes that you can take care of these details on your own. Instead, it concentrates on helping you identify and rank your goals and evaluate your alternatives.

Expert Choice uses a system called the Analytic Hierarchy Process, originally developed by Thomas Saaty at the Wharton School and described in his books, *The Analytic Hierarchy Process* (McGraw-Hill Int'l., New York, 1980) and *Decision Making for Leaders* (Wad-

worth Publishing, Belmont, California, 1982).

This decision-making process uses an inverted-tree diagram to illustrate the components of a decision (see Figure 3). The topmost node, or trunk, of the tree is the overall goal—for instance, selecting the most cost-effective computer. In this tree, the underlying nodes, or branches, that represent key objectives might be software availability and low price. The third level corresponds to the leaves of the tree, which represent the alternative choices—the computers under consideration. Note that each branch bears the same leaves, because *Expert Choice* evaluates how well each alternative meets each objective. There can be up to six levels in a decision tree, but the lowest level always contains the leaves—the alternative choices.

Draw a Tree

Expert Choice gives you a comprehensive set of editing commands to help you draw your decision-tree diagram. With a few keystrokes you can add or delete nodes from the diagram or enter node descriptions. Unfortunately, the writing space in each node is limited to eight characters, so you have to think up creative shorthand labels to express your goals and alternatives.

You navigate from node to node using the cursor-control keys, or, in larger diagrams, you may want to use the jump command, which allows you to go directly

to a particular node. *Expert Choice* will show only three levels of a tree at any time, but you can focus on any part of the tree by using the program's redraw command. *Expert Choice* also includes a replicate command that duplicates the leaves at the bottom of the tree onto a number of different branches.

Once you've drawn the tree, you can rank your goals and alternatives. You do this by making "pairwise comparisons"—that is, *Expert Choice* presents the nodes of each level, two at a time, and you judge which is more important (or more likely or more preferable) and by how much. You compare the nodes using either a verbal or a numerical scale. You can see an example of the verbal mode in Figure 4. Using the cursor-control keys, you move the arrow to one of nine positions on the scale from equal to extreme. In this example, software availability is "strongly" to "very strongly" more important than cost.

Or, you can use a numerical scale, as shown in Figure 5. Here, the scale of odd integers from 1 to 9 indicates the relative importance of the goals. In this case, I decided that software availability is six times more important than computer cost. This screen also displays a matrix showing the pairwise comparisons of the other nodes on this level.

Expert Choice comes with a validation example that compares the final results achieved by these two methods. The exer-

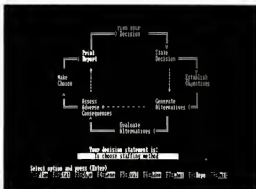


Figure 1: *Decision Aide*'s main menu depicts the decision-making process as an unbroken loop.

Figure 2: The program picks your brain for basic information before you can begin working toward a decision.

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Thoughts on Thinking

Unlike traditional thought processors, PMI can help you evaluate ideas and situations.

Outline or "thought" processors are just one more useful tool in the never-ending struggle to generate, capture, organize, and communicate ideas and information. They help you to sort, randomize, and otherwise manipulate information—all useful functions in the thinking process. Despite all the advertising claims by software manufacturers, however, a thought processor can't and won't make you a better thinker.

Simply learning to operate an outlining or word processing program isn't enough. In order to operate it quickly and efficiently you need to invest time, effort, and practice. For instance, if you're not a trained typist, you'll get by at a minimum level with the hunt-and-peck method, but you'll always fall short of maximum possible productivity and ease. Likewise, unless you're a trained thinker, you won't get the best out of a thought-processing program or your computer.

A Thinking Tool

PMI, a systematic thinking tool developed by Edward De Bono, Ph.D., founder and director of the Cognitive Research Trust in Cambridge, England, helps you to improve your thinking skills, and you are able to use it with or without an outlining program. Using the PMI technique, you look for the pluses, minuses, and interesting points in any idea, proposal, or situation. You always list the Ps first, the Ms second, and the Is last. The interesting points are neither positive nor negative but are phrased: "I wonder whether . . ." or "Wouldn't it be interesting to see if . . ." PMI is a fast, highly focused, and deliberately managed operation that forces you to enlarge your view of the situation at

hand.

If you're used to the old technique of listing only pros and cons, you're leaving out the interesting points that are useful stepping stones to other ideas and perceptions. The PMI technique forces you to look at these other possibilities. And if you train yourself to use PMI regularly, you'll find that the technique is most effective when your mind is already made up because it helps you double-check your judgment.

Now, let's try a 3-minute PMI exer-

If you're used to listing only pros and cons, you're leaving out the interesting points that are stepping stones to other ideas. PMI forces you to look at these other possibilities.

cise. In 3 minutes and in order, you try to generate as many Ps, Ms, and Is as possible on the idea that the government should buy everyone a computer. You either write them down, say them out loud, or enter them into an outlining program. You may be surprised to learn that effective thinking can be done in only 3 minutes if you consciously use focused thinking techniques. Unlike those in a computer, the "switches" in your mind get tired the longer you use them. Your brain tends to loop back and repeat previously generated thoughts instead of coming up with new arrangements of information. Do 3-, 5-, and 10-minute PMIs, compare the results, and then see if the quality and quantity output justifies

the additional time. In my experience, several 3-minute PMIs are more productive than a single long one, but your cognitive endurance may be greater.

The Intelligence Trap

Thinking can be taught, learned, practiced, and mastered just like any other skill. A 3-minute PMI is a useful tool to help you overcome the "Intelligence Trap," a universal phenomenon discovered by the Cognitive Research Trust in Cambridge, England. The intelligence trap theory maintains that when you come upon a situation or idea, you usually make an instant judgment as to whether you like or dislike it. Your judgment may be based upon your values, your emotional state at the moment, or your past experience with a similar situation. You then use your mind to defend that snap judgment. The more intelligent you are, the more strongly you are able to convince yourself that your instant judgment is correct—and the more difficult it becomes for you to reverse your snap decisions.

A trained thinker perceives all situations and ideas from as many different angles as possible by using appropriate thinking tools and techniques and only then will that thinker make a judgment. The judgment may still be based on emotions, values, or experiences, but the trained thinker will have wider perceptions and more valuable arrangements of information with which to work.

—Richard W. Ruth

Richard Ruth, a consultant with the Cortex Consulting and Training Group in New York, gives workshops and seminars in microcomputer applications, decision making, problem solving, stress management, and creativity.

ments. However, if you discover that the inconsistency in your model reflects real-life inconsistency, the high ratio does not interfere with the continued operation of the program.

When you've completed all of the pairwise comparisons in your tree, *Expert Choice* prints a report showing how well the alternatives in your "leaves" stack up against each other. The report is terse and makes liberal use of the program's specialized terminology. If you want to show it to someone unfamiliar with the analytic hierarchy process, you'll have a lot of explaining to do.

Despite its formidable terminology, *Expert Choice* is a relatively easy program to learn. The manual explains the program in great detail and uses several sample decision files that come with the program. It also does a good job of explaining the analytic hierarchy process and how it can be used in group decision-making. One inconvenience is *Decision Support Software's* copy-protection scheme; however, the company will send you a free backup disk when you send in your registration.

Choosing a Program

How do these two programs stack up? Each offers a structured approach to decision making with different strengths and weaknesses. The models in *Expert Choice* are easier to modify, and its multilevel structure makes it better suited for organizing very complex decisions. Also, the program shows no irritating design flaws or bugs. On the other hand, devotees of the Kepner-Tregoe methods would enjoy *Decision Aide*, which offers more help in preparing the groundwork for the decision and produces a more readable report. Decision makers with a limited budget might also prefer *Decision Aide* because it costs about half as much as *Expert Choice*.

Testing a sample decision with both programs yielded almost identical results. That's not surprising when you consider their fundamental similarity: Both programs force you to pay attention to your goals and their relative priorities before you begin evaluating alternatives. So, depending on your goals and priorities, choosing one of these programs is a decision you'll have to make on your own. ■

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MAXTHINK

A Little Buggy

New software with a lot of features tends to be a little buggy, and *Max* is no exception. I locked up the keyboard several times while trying to figure out TPL. But the most spectacular bug I found was in the View command, which lets you see your entire outline (see Figure 5 below). If you ask for a few unusual options with this

Do MaxThink's brainstorm
commands really
increase the depth of
your thought? Hell, no.

command, the program goes totally berserk and sends garbage up the screen to the accompaniment of frantic beeps. Not even a warm boot calms an enraged *MaxThink*.

MaxThink can not deal with DOS error messages. If you try to print before you turn on your printer or try to write to an empty drive, the error messages stay on the screen. If you ignore the drive-not-ready message, *MaxThink* kicks you out to DOS—and kicks your outline right out of memory.

Max can't use all of your computer's memory. It never sets aside more than about 42K RAM for an outline, which

means that you can't write more than about 20 single-spaced pages. Moreover, *MaxThink*'s brainstorming tricks also take up memory, so if you tried to make major modifications on a smaller outline, you could run out of memory. The company promises that a new release will correct these flaws.

But, even without bugs, what can *MaxThink* really do for you? Sure, it can help you write outlines. But do its brainstorm commands really increase the depth of your thought? Hell, no. When you use the Binsort command, you have to decide how you are going to sort the list, and then you have to do the sorting. *MaxThink* doesn't help you think any more than a word processor does.

Some day, somebody will invent a real thought processor. In response to the list in Figure 1, it might say to itself, "Aha. Except for Hawaii, these are all independent nations." It might then ask you if you'd like to do a sort by GNP per capita, land area, proximity to the equator, age of prime minister, or whatever. Once you told it what to do, it would look up the data and do the sort.

Yes, I think I could use a program like that. In fact, at \$59.95 a copy, I might take two or three. Unfortunately, it will be some time before software that can really think for you shows up on the market. ■



Figure 5: MaxThink's View command shows you everything in the outline at once.

On-Line Encyclopedia for DOS Users

On-line DOS help is just a keystroke away. OLE is organized both by subjects and alphabetically by key words. Beginners will love it for learning broad DOS areas; experienced users will want it for quick-referencing complex commands. It's the one program no DOS user can afford to be without! And OLE is pure pleasure to use.

OLE will eliminate or greatly reduce your users' education and support time. It will free your company's "resident DOS authority" to spend time on more important things. And of course, make ALL your DOS users more productive—for a better return on your company's MIS investment.

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***Cuts through all the confusion
in the DOS User's Manual.***

[illegible]

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CIRCLE 158 ON READER SERVICE CARD

Negotiating One-Upmanship

A new software genre has sprung up that purports to offer business people individualized guidance.

Exemplifying this type of software, The Management Edge helps you deal with your co-workers, while The Art of Negotiating aids you in refining your bargaining strategies.



At prices somewhere between *The One-Minute Manager* and 2 year's tuition at Stanford Business School, business skills-and-strategies software seeks to offer managers individually tailored approaches to help negotiate, manage, counsel, and assess coworkers, bosses, subordinates, and the public.

The Management Edge by Human Edge Software and *The Art of Negotiating by Experience* in Software are typical of this small but growing genre.

The Management Edge offers you a plan for dealing with others in your company based on your own personality traits, those of other workers, and on the general attitude of your company. A spokesperson for Human Edge Software, which was formed in 1983 by clinical psychologist Dr. James Johnson, says there are "acknowledged pieces of advice" for given situations. You tell the PC the situation; the program digests it and gives you the advice.

The Art of Negotiating helps you prepare for an upcoming negotiation by having you and your assistants examine the issues involved, your objectives, the concerns of the other side, and some possible strategies. The program is based on a series of books and seminars by Gerard I. Nierenberg. Experience in Software calls Nierenberg "the father of contemporary negotiating." *The Art of Negotiating* doesn't offer solutions as much as it forces you to focus on the task at hand and then

outlines your input information on screen or on paper.

The Management Edge

The Management Edge is one of four \$195-\$295 business strategy programs from Human Edge Software of Palo Alto, California. Other software in the series are *The Sales Edge*, *The Negotiation Edge*, and *The Communication Edge*.

Management Edge's copy-protected disk offers self-assessment and assessments of your subordinates, your boss, and your company. You're asked to agree or disagree with a series of statements and personality descriptions about each person and the company in general. The program then grinds away—actually, it doesn't take much longer than deciding between a Big Mac and a Quarter-Pounder—and suggests a course of action.

To believe in *The Management Edge*, you have to accept that psychologists can get a pretty good idea about what makes you tick based on your likes and dislikes (for example, "I often worry too much about work," "I am against capital punishment"). These types of questions are the basis for many tests used to determine everything from who should be entrusted to protect the president to who's sane enough to stand trial for an ax murder. You also have to believe that a reasonable, nontrivial version of such a test can fit into 400K of Pascal code and text file.

The Management Edge's 175-page,

ONE-UPMANSHIP

IBM-size documentation comprises four sections: a user's manual, a quick reference guide, a summary of the fundamentals of management, and a set of contact records to document your meetings with subordinates and note your impressions of them by ticking off any of 104 adjectives that may apply (from achieving and ambitious to wary and worrisome).

The Management Edge can store information on a manager (yourself), a company, and as many subordinates and superiors as a disk will hold. Setting up the program for the first time takes an hour or so. It might have been quicker if the manual provided more technical help, such as whether you can use a hard disk (you can't) or whether you can use both drives on a two-drive system. Updates to analyze a new employee or situation could take 15 to 30 minutes.

Using the Edge

I booted up the copy-protected program and laid out a mythical workplace scenario with several hundred white- and blue-collar employees with temperaments ranging from Type-B personalities to outright catatonics, sprinkled with a few aggressive middle managers and some laid-back upper management. Pay scales are mediocre to adequate, almost no one gets fired for incompetence (the union might object, and besides, the company is making enough to carry a little deadwood), and



PC FACT FILE

The Management Edge
Human Edge Software Corp.
2445 Faber Pl.
Palo Alto, CA 94303
(415) 493-1593
List Price: \$250

Requires: 128K RAM, one disk drive.
CIRCLE 696 ON READER SERVICE CARD

The Art of Negotiating
Experience in Software, Inc.
2039 Shattuck Ave.
Berkeley, CA 94704
(415) 644-0694
List Price: \$495

Requires: 256K RAM, two disk drives
or one disk drive and hard disk.
CIRCLE 695 ON READER SERVICE CARD

internal advancement is slow but possible. Sound familiar?

The first part of the program involves self-assessment. *The Management Edge* offers 80 agree-disagree statements on screen, one at a time, that examine your managerial attitudes and opinions. You get quizzed on such beliefs as, "The concept of a good company man is outdated" and "Being popular at work is important to me." Some statements are loaded, such as "I would like working in a one-person

office." Do you want to tell a machine you have loner tendencies if you're supposed to be a manager?

Other sections deal with interaction with others, compatibility with your organization, problem solving with subordinates, determining your management skills, and assessing your superior. Once you have completed the self-assessment and at least one other section, *The Management Edge* offers an on-screen or printed analysis on those areas.



Based on my theoretical scenario, *The Management Edge* reported, "Managers such as yourself typically expend a good deal of energy maintaining a friendly, relaxed work atmosphere. . . . While subordinates may be members of one big, happy family, that family is likely to be an idle one as well."

About the boss, *Management Edge* said, "Because Mr. _____ is minimally invested in his position, you will have to work hard to overcome his managerial

deficiencies." Concerning a subordinate that was described as a perpetual pain, *The Management Edge* says, you should "go easy on Mr. _____; he is not likely to be a recurrent behavior problem."

Most of the reports run less than half a page, while an analysis on the interaction between a manager and a specific employee could run 8 pages or more if added options are chosen. The reports are combined from text files already on disk, then semicustomized by inserting descriptive

adjectives chosen earlier in describing yourself and others (see Figure 1), Mr./Mrs./Ms. titles, and the subject's initials. Which paragraphs are output depend on the descriptions of yourself and your coworkers.

Some of the insights seem interesting, while others might be trivial or misleading. You buy a \$250 program, tell it nobody works very hard, and the program spits back, "Nobody works very hard."

No matter how saintly you make the other guy seem, *The Management Edge* generally suggests the flaws lie with the other person.

No matter how saintly you make the other guy seem, *The Management Edge* generally suggests the flaws lie with the other person, not with yourself. That's probably what you want to hear, but is it always accurate?

The Art of Negotiating

The Art of Negotiating is a "self-help expert process" or a piece of "human-potential software," according to Roy Nierenberg, president of Experience in Software and son of Gerard Nierenberg.

The most obvious difference between this program and *The Management Edge* is that *The Art of Negotiating* offers no answers or suggested courses of action. It's similar to an outlining program or thought organizer devoted exclusively to negotiating.

In addition to the copy-protected program disk (a back-up is included) and an IBM-size reference manual, there is a 400-page textbook, *Fundamentals of Negotiating* by Gerard Nierenberg, and a workbook. The program calls for 256K RAM, and even that's a tight fit. You may have to clear auxiliary programs such as *ProKey* from memory and dump some nonessential DOS files, such as CONFIG.SYS if it includes memory-absorbing BUFFERS or FILES statements. About 237K of free memory is needed after DOS is on board.

ONE-UPMANSHIP

You work through eight modules: subject matter, objectives, issues and positions, fact-finding, needs and gambits, climates, strategies, and agenda.

The first six modules ask you to describe and rank the importance of your objectives and those of your "opposer" (that term is preferred to "opponent," which sounds too warlike). You're asked to describe issues and positions from your viewpoint and from your opposer's, and then to check off issues both sides might be willing to concede. Space for answers is limited, which might seem stifling to some. Your opposer's name can have no more than 13 characters, and other descriptions can't take up more than 40 or 55 characters.

The other two modules require you to pick the best applicable answers from a fixed menu. You choose from 14 negotiating topics and 29 negotiating strategies. Brief explanations of all negotiating terms and concepts are available on-screen and are explained in great detail in the accompanying text (see Figure 2).

After you're all done (a session might run 2 hours), the program gives you a printout of your planned course of action. If you covered all eight modules, the printout will run to 10 pages or more. The program makes no attempt to analyze the situation or suggest that you made good or bad choices. Rather, the printout is a recitation of the information you entered.

The Art of Negotiating requires a great

deal of educated guessing on your part. You must decide, for instance, which of the 29 strategies you believe your opposer will use. The bottom line is that this system is really no more skillful than the person using it.

The information in the \$495 program is also covered in Nierenberg's negotiating

**The Art of Negotiating
requires a great deal of
educated guessing. It is
really no more skillful than
the person using it.**

textbooks, which are much less expensive. So what does your \$495 buy beyond a fancy outline capability? Experience in Software claims three extra features: The areas covered vary, depending on your initial answers, so *The Art of Negotiating* is somewhat "tailored" to specific situations. The company contends the program "streamlines preparation time" by sorting lists of negotiating priorities faster than you could by hand—but I feel a database could do so just as well. With a textbook, if you're stumped by a tough question, you can turn the page; *The Art of Negotiating* won't move ahead until you confront each issue. This limitation forces you to consider the other side's point of view.

Some negotiators may find the money well spent because it allows you to quickly

assemble and print a strategy report that you can pass along to your assistants.

Technically, the program is well put-together and suffers from no obvious bugs (just don't accidentally hit Ctrl-C or Ctrl-Brk or you'll be ejected unceremoniously to DOS). Function keys F1 and F2 are used to call up general or specific help screens, and F10 is used instead of the Enter key to continue along. The beep generated if you make an error is obnoxiously loud—so loud that the reference manual calls it a "Klaxon."

Worth the Money?

Should you buy *The Management Edge* or *The Art of Negotiating*? *The Management Edge* condenses the knowledge of a Ph.D. onto disk in useful form, but it's still in the trial-and-error stage. While the suggestions the user gets back aren't outright wrong—and some are indeed helpful—they can be a bit vague.

The Art of Negotiating doesn't tell you what to do, so you can't fault it for offering vague or incorrect advice. Rather, the question here is how much value you'll get beyond the \$10 to \$25 you'd spend on a negotiating textbook. If this were a \$25 textbook package with an additional \$25 disk option, it might be a better deal.

Perhaps more-sophisticated and less-costly business skills-and-strategy programs will evolve in the near future. For now, some users may find management-analysis software a trivial pursuit. ■

Interactions with others		1	2	3	4
	Agree		Disagree		
0. unconventional	2				
1. apprehensive			2		
10. empathetic	2				
11. competitive	2				
12. quiet			2		
13. sympathetic	2				
14. egotistic	2				

Use arrow keys to move through list and to select your response.
Use space bar to advance to next page.

ESC=EXIT F1=HELP F2=INFO F3=MENU F4=MENU F5=MENU F6=MENU F7=MENU F8=MENU F9=MENU F10=MENU

Figure 1: The Management Edge provides adjectives with which you can assess yourself and others in your company.

Explanations of strategies	
The three groups of strategies are below. You'll need to SCROLL down quite far to see all of them. SELECT any strategies that you want explained.	
STRATEGIES (29 in all)	CLARIFICATIONS
WHEN STRATEGIES (8) forbearance patience wait wait wait wait wait wait wait	patience pays sudden shift in timing accomplished fact - proved it's settled leave leave, but have an interested party stay adopt opposite set deadlines, gettings, etc. look right, go left
HOW AND WHERE STRATEGIES (8) participation association	we are friends endorsement

ESC=EXIT F1=HELP F2=INFO F3=MENU F4=MENU F5=MENU F6=MENU F7=MENU F8=MENU F9=MENU F10=MENU

Figure 2: An explanation screen from *The Art of Negotiating* detailing 3 of the 29 defined negotiating strategies.



2001: Futuristic Accounting?

FIS's 2001 tries hard to be the ultimate accounting system for small businesses, but it's no great advance.

And why does it need its own board?

Small businesses often approach buying an accounting software package with mixed emotions. They need the software's power and flexibility to handle their current work and expected growth. But many fear the complexities associated with a computerized accounting system.

Financial Information Systems (FIS) of Richardson, Texas, developed its 2001 accounting package to give small businesses a powerful and sophisticated accounting tool that is easy to use. But it's not easy to say whether it succeeds.

On one hand, 2001 is generally a "friendly" system. Its response time is fast. Its documentation adequately guides you through its nine modules. The hard-copy audit trail the modules print appears sufficient. And the software is sophisticated enough to meet the needs of many small businesses.

On the other hand, we encountered several minor but annoying problems in using the software that we could only resolve

after phone support from FIS. We found 2001's screen formats rather primitive. And it needs a special board, a requirement we found peculiar for an accounting application on the PC.

Overview

2001's modules include general ledger, accounts receivable, inventory, accounts payable, payroll, and invoicing. The package also offers optional modules for job costing, departmental accounting, and database software that can be used to design custom reports.

The various modules are tightly integrated. When you enter a transaction anywhere in the system, all other modules are immediately updated. This feature allows you to avoid running module-to-module data-passing programs but means you need stricter accounting controls. All except the departmental accounting module can be run as standalones.

The complete 2001 system comprises

approximately 3.5 megabytes of code written in a combination of assembly language and BASIC. The software was originally written for (and is still supported on) the Apple II and IIe and is now available for the IBM PC and compatibles.

In addition to 23 floppy disks, the complete 2001 system comes with a device that looks like an extra memory board. FIS has dubbed this device the 2001 accounting computer. It is a real computer; it contains its own processor and operating system as well as extra memory. According to FIS, the board, which fits in an expansion slot, is "the secret" to the speed and flexibility of 2001's menus, input screens, and data processing. Despite these claims, we didn't find that the system functioned significantly faster than other, comparable accounting packages. It was responsive, yes, but no more so than you might expect from the PC operating alone, without the extra CPU.

Once you install it, you never work with the board again or notice its operation. Installing the board (into a long expansion slot) and the software onto a hard disk is straightforward and can be accomplished in less than an hour. Although the system can be run on flo-



2001

Financial Information Systems, Inc.
411 Industrial Drive, Suite 107
Richardson, TX 75081
(214) 680-8696

List Prices: Full system (all modules except job costing) \$3,995.

Starter set (general ledger, accounts receivable, accounts payable, payroll and 2001 accounting computer) \$2,449. Basic unit (any one module and 2001 accounting computer) \$795.

Additional modules: general ledger, accounts receivable, inventory, accounts payable, invoicing, payroll, job costing, departmental accounting, database, \$595 each.

Requires: 256K RAM, 132-column parallel printer or 80-column with compressed mode, two 360K floppy drives or one 360K floppy drive with a hard disk.

CIRCLE 688 ON READER SERVICE CARD



Figure 1: The accounts payable screen, which is used to add vendors, is representative of the appearance of many of 2001's data entry screens, that is, straightforward but graphically uninteresting.

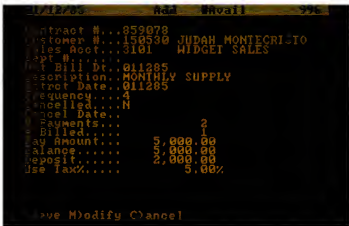


Figure 2: The invoice entry screen from the accounts payable module. Help messages are available for this and many other 2001 input screens.

pies with a lot of disk swapping, a hard disk is much more convenient.

A utilities menu included with the software makes setting up the system and backing up your data quite straightforward, requiring only minimal computer experience. You're coached through the system setup process by a series of menus that prompt for key items like hardware

type, modules purchased, company information, and the like. Backup of data to floppy disks is also easy. Again, you're guided by a series of menus that make this important job simple and therefore more likely to be done faithfully.

As the system's data files begin to take up most of the available space on hard or floppy disks, the program will prompt you

to initiate the convenient "volume manager" utility. It will then direct you through procedures to reorganize and compact the records on your disk, a process that enables the system to store your data more efficiently.

All the modules offer password protection. Different passwords, which do not display on the screen, can be assigned to each module and the various utility functions. Your individual password determines your ability to access any given module.

Once you have the system up and running, you may find the appearance of the

The appearance of the screens is quite unusual. All main menus and most data entry screens use large 40-column format characters.

screens quite unusual. All main menus and most data entry screens use large 40-column format characters, as opposed to the more common 80-column format. FIS claims this format makes the screens easier to read; however, it also limits the amount of information that can be presented on each.

Several of 2001's screens feature online help. When you simply depress the Alt and H keys simultaneously, a message appears explaining the purpose of the screen and the type of input required. Sometimes it even suggests input alternatives. This help feature, however, is not available throughout 2001, and in one module, job costing, it was available but did not work.

Many of the modules permit you to make special searches or selections of your accounting data, an impressive feature. You can also make special "inquiries" to review all data meeting certain criteria. For example, in the accounts payable module, you can make a search of the vendor file that is based on vendor number, vendor name, outstanding balance, and other data fields. Up to 14 criteria can be specified when you're requesting a selection of data. We found this feature to be quite so-

How Do I Choose the Right Personal Computer Monitor?



plicated and potentially useful for a small business.

General Ledger

The general ledger accumulates financial transactions (journal entries) automatically generated by other modules, processes manual journal entries, and generates basic financial reports (general ledger, balance sheet, and income statement). The general ledger also permits a monthly and annual budgeting. While you don't need the general ledger to use the other modules, it does integrate nicely with the rest.

Financial transactions created by subsidiary modules are temporarily stored in a "general journal" file prior to posting to the general ledger. You can't edit or modify the contents of this file, other than by making additional journal entries. From an accounting control perspective, this restriction is comforting. However, we did find the inability to edit these transactions frustrating when we ran into some software bugs.

At one point we were able to create a journal entry that did not balance with the invoicing module. And we later charged a nonexistent general ledger account using the accounts receivable module. (FIS representatives tell us that these problems have now been corrected). In each case the general ledger module would not allow the resulting incorrect journal entries to post to the ledger. However, we could not remove these entries from the general journal without telephone help from FIS.

The numbering system for 2001's chart of accounts makes organizing the ledger and preparing balance sheets and income statements simple. Account codes can be up to 6 characters long and can be tailored somewhat to meet your needs. However, the first two digits must designate the major and submajor account categories. For example, the major accounts might be:

1. Assets
 2. Liabilities and net worth
 3. Revenue
 4. Cost of sales and/or direct expenses
 5. (Unused)
 6. Operating and/or overhead expenses
 7. Other income or expenses
- And you might establish submajor accounts as follows:

INVOICE Add 04/01/98 2227

Invo. #.....789065
 Vend. #.....100030 JAMIE O'KANE'S GAL
 Acct. #.....1301 FURNITURE & FIXTURES
 Date.....01/11/85
 Description...PC HUTCH
 Hold.....N
 Terms.....NET 30
 Dtpaid.....01/18/85
 Job/Elem.....
 Dept.....
 Pay Amount.....450.00
 Charges.....450.00
 Payments.....0.00
 Balance.....450.00

Slave Modify Cancel

Figure 3: Customers can be automatically billed through the use of 2001's "cycle invoicing" feature. All information related to the cycle invoicing of a vendor can be input at the screen shown above.

JOB COST		DUPRE COMPANY INC.				PAGE 2									
REPORT BY SUBCONTRACTOR						MATERIAL		LABOR							
SUBCONTRACTOR	JOB	ELEM	ACTY	STMT	COMP	BUMET	QTY	AMOUNT	HOURS	AMOUNT					
JED 0111 TOTALS :	0111	0004	0A3004			11,200.00	100.00	4,500.00	0.00	0.00					
		0005	0A3004			8,372.33	0.00	0.00	0.00	0.00					
		0006	0A3004			0.00	0.00	0.00	451.25	0.00					
		0011	0A3004			5,450.00	0.00	0.00	0.00	0.00					
		0012	0A3004			10,000.00	0.00	0.00	0.00	0.00					
		0013	0A3004	0E1504		10,000.00	0.00	0.00	0.00	0.00					
		0014	0A3004			8,050.00	0.00	0.00	0.00	0.00					
		0015	0A3004			7,500.00	0.00	0.00	0.00	0.00					
		0016	0A3004			15,000.00	0.00	0.00	0.00	0.00					
		0017	0A3004			2,500.00	0.00	0.00	0.00	0.00					
		0018	0A3004			2,500.00	0.00	0.00	0.00	0.00					
		JED 0111 TOTALS :				86,516.25	100.00	4,500.00	451.25	0.00					
	JED 0112 TOTALS :	0112	0004	0A3004		0E1504	0.00	0.00	0.00	0.00	0.00				
		0004	0A3004			0.00	1,000.25	4,500.25	0.00	0.00					
JED 0112 TOTALS :						0.00	1,000.25	4,500.25	0.00	0.00					
JED 0113 TOTALS :	0113	0004	0A3004		0E1504	0.00	0.00	0.00	0.00	0.00					
		0004	0A3004			0.00	0.00	0.00	0.00	0.00					
	JED 0113 TOTALS :					0.00	0.00	0.00	0.00	0.00					
SUBCONTRACTOR TOTALS :						86,516.25	1,000.25	9,000.42	451.25	0.00					
	FRED JONES														
	0111	0004	0E1504		0E1504	25,000.00	0.00	24,500.00	0.00	0.00					
FRED JONES	0002	0E1504				10,000.00	2,075.00	6,975.23	50.00	475.00					
	0007	0E1504				7,750.00	1,000.00	2,500.00	30.00	300.00					
	JED 0111 TOTALS :					42,750.00	3,075.00	36,975.23	50.00	775.00					
SUBCONTRACTOR TOTALS :						42,750.00	3,075.00	36,975.23	50.00	775.00					
PETE PLUMBER															
0111	0004	0E1504		0E1504		12,200.00	0.00	0.00	0.00	0.00					
JED 0111 TOTALS :						12,200.00	0.00	0.00	0.00	0.00					
SUBCONTRACTOR TOTALS :						12,200.00	0.00	0.00	0.00	0.00					
SAM SUBCONTRACTOR															
0111	0002	0E1504				7,500.00	3,000.00	5,500.00	0.00	0.00					
	0006	0E1504				11,700.00	0.00	0.00	0.00	0.00					
	0007	0A3004				10,020.23	0.00	0.00	0.00	0.00					
JED 0111 TOTALS :						29,220.23	3,000.00	5,500.00	0.00	0.00					
SUB SUBCONTRACTOR TOTALS :						29,220.23	3,000.00	5,500.00	0.00	0.00					
REPORT TOTALS :											170,400.50	7,100.25	11,074.76	125.00	1,205.25

- 1 Assets
- 12 Current assets (submajor)
- 121 Cash on hand
- 122 Cash in savings
-
-
-
- 13 Inventory (submajor)
-
-
-

The financial statement formats are predefined; the system prepares financial statements automatically using the major and submajor account titles. This structured numbering scheme will require some 2001 users to redesign their existing chart of accounts to ensure that their financial statements make sense. However, the system should be flexible enough for many small businesses. While the system can accommodate more than one company, it cannot perform consolidations of multiple companies.

A hard-copy audit trail is a desirable feature in almost any system but is especially important in on-line systems like 2001. As with other modules, the 2001 general ledger system produces a detailed audit trail by requiring you to produce numerous reports as information is processed. In addition to the required reports, 2001 will display many (but not all) frequently used reports on the screen as well as the printer.

Accounts Payable

The accounts payable module is relatively versatile and easy to use. You can distribute invoices to as many as ten different general ledger accounts and departments. It also allows you to enter and maintain a vendor file, but if, when you are entering invoices, you encounter a vendor that you have not previously entered using the vendor maintenance function, the system will allow you to add it "on the fly." You may select invoices for payment based upon their due date, the vendor number, and/or invoice number.

The vendor maintenance and invoice entry screens illustrated in Figures 1 and 2 are typical 2001 screen formats. The word *format* is probably inappropriate—most of the screens are simply a list of the data items to be entered, with little attention

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to the clarity of their design.

Accounts payable is integrated with general ledger, job costing, and inventory. The automatic tie-in to inventory can be an advantage. However, if your business involves frequent inventory returns or adjustments to vendor payments for merchandise received, you're probably better off not using this automatic interface.

The accounts payable module includes a complete list of standard reports such as vendor lists, invoice aging and cash requirements lists, form 1099s, checks to vendors, and check registers. It also handles cyclical payment of such recurring charges as rent.

One potential source of problems is that the system allows you to delete a vendor with open accounts-payable balances. While such a deletion won't throw the system out of balance, it might create confusion in determining which outstanding invoices apply to which vendors.

Accounts Receivable, Invoicing

Although accounts receivable and invoicing are sold as separate modules, they are so interrelated that we have considered them together. You use the invoicing module for entry of charge sales and prep-

The 2001 general ledger system produces a detailed audit trail by requiring you to produce numerous reports as information is processed.

aration of related invoices. With the accounts receivable module, you can establish and maintain customer balances—recording invoices, customer account adjustments, and cash receipts. Special procedures are included for those who

need to set up recurring ("cycle" or contract) invoices that are processed automatically every month (see Figure 3). Through a processing function called "sales slip," cash and credit card sales can be entered into the invoicing and receivables modules. This 2001 feature would be handy for small retail businesses or any business that has a significant volume of cash or credit card sales.

Sales can be distributed to as many as 40 different general ledger accounts, far more than most businesses will ever need. Invoicing routines are sufficiently sophisticated to handle the requirements of many small businesses. They allow you to properly describe invoiced items, prices and discounts, and different terms. These routines were so complex that we needed to use the help feature. Unfortunately, it can't be accessed from this screen.

More importantly, we found that the system did not adequately edit all the invoicing data. It accepted invalid information while entering certain discount terms. This error created an incorrect, unbalanced journal entry in the system, one of several minor but annoying bugs we found in different modules. We also noted that accounts receivable accepted nonexistent general ledger account numbers. When we discussed these problems with them, FIS representatives said they would be corrected in subsequent releases.

As in other modules, we found the variety and content of the reports printed by the system to be good. 2001 prepares customer lists, mailing labels, aging and forecast reports, and even a daily cash deposit report. Like accounts payable, this module lets you select and list your customer data in an impressive number of ways using the extensive 2001 criteria-selection inquiry feature.

Inventory

Inventory is one of the easiest 2001 modules to use. It facilitates basic inventory management, including establishment and maintenance of an inventory item file and the posting of purchases (receipts), issues (say, for sales or to a job), and adjustments. You're able to establish and maintain three different price levels for an inventory item. You can also track reorder quantities by item and extract such useful

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reports as an inventory (stock status) listing, a reorder report, a returned parts list, and a price list.

The inventory module is neatly integrated with the general ledger, invoicing, accounts payable, and job-costing modules and is designed to be an on-line perpetual inventory system that updates your inventory records as sales, purchases, and other inventory transactions occur. The only inventory-costing alternative offered in the inventory module is average cost. Alternatives like the first-in, first-out (FIFO) and last-in, first-out (LIFO) methods are not available.

2001's inventory module has a number of features designed to make inventory management easier. For example, it helps you track inventory by location and includes a set of functions to assist you in carrying out and recording a physical inventory (printing count sheets and so forth). Further, 2001's extensive inquiry facility lets you examine your inventory records using selection criteria you establish.

Payroll

The 2001 payroll module operates with impressive speed and is relatively easy to use—a difficult statement to make about many microcomputer-based payroll applications. The software can handle up to 300 hourly and salaried employees. You need only enter current time and attendance information (such as dates, overtime rates, and hours), adjusting for any nonstandard payments or deductions for employees and then indicating which employees to pay. An employee's payroll expense can be distributed to several general ledger expense accounts by entering the different expense amounts and general ledger account numbers as separate transactions. The system accommodates a multistate payroll.

A typical selection of reports is available from payroll: checks, check registers, quarterly and year-end summaries, information for federal payroll tax reports, and W2s at the end of the year. Checks can be printed more than once; the system will accept the final run for accounting purposes when told to do so. This feature should make payroll processing less intimidating if you're unfamiliar with automated accounting systems.

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Job Costing and Departmental Accounting

Job costing and departmental accounting, though separate modules, are similar in function and design. Job costing is inte-

grated with payroll, accounts payable, invoicing, inventory, and accounts receivable. Departmental accounting, on the other hand, is integrated with all modules except job costing.

Both modules work outside the general ledger, which is typical of job-costing packages but unusual for departmental accounting. The 2001 documentation explains that they operate outside the ledger to keep the ledger from becoming too complex; this particular objective is accomplished. However, good accounting practice would warrant your reconciling balances in these two modules to those in the general ledger every month, which for departmental accounting would be an extra burden.

The departmental accounting module functions very much like the general ledger module. You can define up to 30 departments using a four-digit department code. You can associate each department code

The 2001 payroll module operates with impressive speed and is relatively easy to use. This is a difficult statement to make about many microcomputer-based payroll applications.

with a general ledger income or expense account (balance sheet accounts can't be used). However, all entries to departmental accounting must be generated by other 2001 modules. Entries can only be manually entered using the departmental accounting module. This restriction will help keep your departmental accounting records in sync with your general ledger. A summary of departmental activity, as well as profit and loss statements, can be printed for one or all departments.

The job-costing module allows you to track costs for individual jobs to produce cost reports by job "element." You establish these job elements to segregate or classify your job costs into logical categories. Examples of job elements could include "slab," "framing," "roof," and so forth. You might subdivide costs into material and labor categories. The system can record such other useful job-related information as estimated start and completion dates, budgeted and contract amounts, and



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CIRCLE 181 ON READER SERVICE CARD

amounts billed and received. Transactions that are entered into the system can be identified with a specific subcontractor, enabling you to produce a handy job cost report summarized for each of your subcontractors (see Figure 4). You can charge labor to jobs through either the payroll or the job-costing module. Unlike with departmental accounting, you can enter transactions directly into the job-costing module.

Database

Using the 2001 database module, you can assemble a variety of custom reports from existing accounting data. For example, sales can be sorted and analyzed by salesperson, customer name, or any of several other criteria. The database is more than a typical standalone report-writer facility. You input data directly into this module to create data files of information outside your accounting records, such as an automobile maintenance schedule. You might use it to create reports that require the integration of accounting and nonaccounting information, such as more informative sales reports that include both sales dollars from your accounting records and associated sales units.

This 2001 feature, although unique and interesting, does have limitations. For example, the version we reviewed couldn't import data from such outside sources as spreadsheets. It's no match for standalone database software such as *dBASE III* or *R:BASE*.

Documentation

A single, large three-ring binder contains all of 2001's documentation. The software comes with a set of sample data, enabling you to become familiar with the system before you load your actual accounting data.

In general, we found the documentation adequate but not so good as that of comparably priced accounting packages. For example, our manual contained an "index" tab but no index! The documentation could be improved measurably with additional use of screen formats coded with "live" information. We also found some discrepancies between the software and the documentation, but no significant problems resulted. With the documenta-

How About Dependability?

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advertisements may even be tagged to the free electronic information delivered to PCs during the digital broadcast segment.

The show's format falls under the bailiwick of Robert E. Lee Hardwick, a veteran radio announcer of 25 years. Hardwick's articulate voice serves as the common thread tying together the distinct parts of the weekly 30-minute show. At the

The Shuttle Communicator converts the static-sounding sofcast from the radio earphone into a serial stream of binary bits—the primordial language of computers.

microphone, Hardwick interviews guests like Bob Landware, developer of software for synthesizing music on PCs, or he demonstrates computing curios such as the *Ghostbusters* theme played over a Commodore computer speaker.

Sharing announcing responsibilities with Hardwick are Chris Burns and Sally Bronson. Burns reviews industry headlines in a segment called News Bytes, from News Soft News Service. Bronson, the director of user affairs, answers questions from the "user mailbox" on topics ranging from software packages that teach typing to chocolate floppy disks.

By itself, the show's editorial content resembles other productions such as the "Famous Computer Cafe" broadcast on radio stations KIEV and KFOX in Los Angeles and "The Computer Chronicles" televised on public broadcasting stations. What separates Hardwick's show from its counterparts, though, is the transmission of software, or sofcasts.

Broadcasting Software

Midway through the show, Hardwick advises the listening audience to ready their equipment for sofcasts. He briefly describes the program or data file to be sent and counts down the sofcast like a rocket launch. A 1-second beep follows, after which the actual sofcast is broadcast. This typically lasts 10 to 12 seconds,

terminated by another 1-second beep. Then Hardwick's voice returns.

To transmit or download software across the air, Hardwick cables a device called a Shuttle Encoder to the serial interface port of his PC. With a program written by Microperipheral, he transfers the file to be sofcast to the Encoder, which converts it to analog signals. These signals can be taped or broadcast directly. Presently, Hardwick tapes his entire show, including the sofcasts, before broadcasting. The show is subsequently played on two AM stations in the Seattle/Tacoma area on Sunday nights, KAMT at 9:30 p.m. and KXA at 9 p.m.

On the receiving end, the audience has an AM radio tuned to the show. Prior to the sofcast, listeners attach a Shuttle Communicator to the radio. A cable coming from the Communicator connects to the radio earphone jack. Another cable connects the battery-powered Communicator with the computer through the serial port.

After the cables between the radio, Communicator, and PC are attached, a special program, also developed by Microperipheral, is executed on the computer. This program operates in a manner similar to a general-purpose communications program such as *PC-TALK*. It accepts a stream of data sent by the Shuttle Communicator to the serial interface and writes the data to a disk file.

The Shuttle Communicator handles the black-box operations of sofcasting. Indeed the Communicator even comes housed in a black box, a 3- by 5-inch unit shaped like an oversized mouse device. It converts the static-sounding sofcast emanating from the radio earphone into a serial stream of binary bits—0s and 1s—the primordial language of computers.

Since the show first went on the air in August 1984, Hardwick has sofcast a plethora of programs. The list includes spreadsheets, flight simulators, picture files, and games aimed at Commodore, Atari, Macintosh, Radio Shack, and IBM PC computers, among others. The public-domain programs distributed through the sofcast were initially received by only a few computers because of the limited availability of Shuttle Communicators. The \$70 Communicators are scheduled for

widespread commercial distributions starting in late March 1985. Meanwhile, Hardwick suggests that users without a Communicator tape the sofcasts. When they later obtain a Communicator, the free software can be captured through the tape recorder earphone jack.

Modemlike Communication

The heart of this novel medium of computing communication lies with the Shuttle Encoder and Communicator. Both devices are patented by Microperipheral. The company licenses the Encoder to radio stations so they can directly transmit software. Alternatively, stations may broadcast Hardwick's show by way of a tape recording or satellite link. Microperipheral has already reached an agreement

Since the show first went on the air in August 1984, Hardwick has sofcast a plethora of programs, including spreadsheets, flight simulators, picture files, and games.

with Learfield Communications of Jefferson City, Missouri, to relay the show via the Westar II satellite. Starting in March, Learfield will sofcast through its 485 affiliate stations to a region covering 750,000 personal computer owners in the Midwest.

To manufacture Shuttle Communicators, Microperipheral will rely on its expertise in developing modems. "The Communicator can be regarded as a type of modem," said Don Stoner, Microperipheral's vice-president of engineering. "It accepts encoded analog pulses and converts them to bits, which are piped to the computer. The bits are assembled into characters by an assembly language program. That program is machine specific; we have a different one for the IBM PC, Macintosh, Commodore, and other computers. The purchaser of the Shuttle Communicator receives the program on a diskette at no extra charge."

Stoner's name is well recognized within the amateur radio community. Twenty-

The Voice of Sofcasting

Robert E. Lee Hardwick, the glib announcer who orchestrates the transmission of software to his radio audience, already has plans to expand and improve his show.

If there's one thing that grabs your attention upon first meeting Bob Hardwick, it's the distinctiveness of his voice. Each tone emanates deep from within the frame of an NFL lineman. The words emerge clear and confident, and the cumulative expression commands respect within a room, over the telephone, or across the spectral frequencies of radio airwaves.

Hardwick's voice has been standard fare over the radio in the Seattle/Tacoma area of Washington state for the past 25 years. While plying his trade from behind a microphone on KVI-AM, Hardwick enamored a large and loyal following with a lively show of news, information, and music, served with a generous helping of Hardwick humor. Central to the production were the antics of Hardwick himself. He has climbed Mt. Kilimanjaro in Africa, dived for sunken treasure in South America, and airlifted toys to children in Alaska after the 1964 earthquake. *Billboard* magazine named him as Radio Personality of the Year in 1978.

Today, Robert E. Lee Hardwick, as he is known on the air, anchors the National Digital Network. His 30-minute "Sofcast" show is broadcast weekly in Seattle and will soon be distributed nationally to a listener area reaching 750,000 personal computer owners. During a regular portion of "Sofcast," Hardwick takes a back seat and relinquishes the microphone to a computer for the direct communication of electronic information to his radio audience.

"I have a reputation for doing things before anyone else does them," Hardwick boasted. "People said, 'You can't broadcast computer data over the radio.' We're showing them otherwise.

"Over the years radio has turned into a mass jukebox. Background music or passive listening is the in thing today. But it's very hard to sell a product with passive listening because you're listening passively. You're not actively involved with what's happening.

"This whole concept we're working on is an active form of listening. It started



Robert E. Lee Hardwick

with a talk show called 'Chipchat' on KVI. Then I teamed up with Microperipheral Corporation and we started broadcasting 'Sofcast' in August."

One of the biggest tasks facing Hardwick and his colleagues is to convince radio stations to air the show. The information age need not exclude radio, but Hardwick says it effectively has. "Sofcast" airs Sunday nights, sandwiched, on one station, between two religious broadcasts, a time when there "is no revenue possibility at all, and hasn't been for 20 years." Yet a computing audience is tuning in, and businesses can reach them through advertising without paying exorbitant rates.

In formatting the weekly radio show, Hardwick aims for a happy medium between the novice and technical connoisseur. His own computing experience

is "extremely limited," and he considers it an asset that he can approach the subject from the realm of the uninitiated. "We don't want to scare the layperson with chiphead talk," he said, stressing the show's populist approach.

Hardwick, affectionately referred to by his colleagues in the broadcasting industry as "The Mouth That Roared," sees sofcasting as a way of counteracting the jukebox syndrome that has captured radio. "The potential for this thing is staggering. For example, when you announce statewide election returns, you just can't list every precinct. Broadcasters don't have time to sit there and read numbers off. Besides, it would put people to sleep. By transmitting electronically through a sofcast, you could deliver an entire state's returns in a matter of 4 or 5 seconds."

Other possible applications include incorporating sofcasting into recordings of popular music. Hardwick mentioned that he has been approached by recording technicians who work with Mick Jagger. Perhaps the lead singer of the Rolling Stones is planning a new format for the group's next album: rock music on one side and a software program that executes a video animation on the color monitor of a PC for the flip side.

The advent of over a dozen computer-oriented broadcasts across the nation, including six television shows, demonstrates that consumers are, in the words of one television executive, "dying for information on how to maximize the investment they have made in a computer." Hoping to satisfy that demand, Hardwick has enlisted the services of an electronic guru. If the sage of Seattle radio has his way, the most talkative host on the airwaves will have the initials PC.—E.J.

five years ago the former schoolteacher suggested launching an amateur radio into space aboard a satellite. At that time, orbiting satellites were closely guarded military secrets. Yet less than 2 years later, in 1961, his proposal became reality. Today satellites ring the globe, echoing transmissions of movies, news, familiar television programs, and innumerable other broadcasts.

"Theoretically, you could sofcast at rates up to 9600 baud," asserted Stoner, who invented the Shuttle Encoder and Communicator. "Unfortunately, most computers couldn't handle it in a one-way mode of communication. So the Encoder and Communicator operate at 4800 baud."

Stoner clarified this point. "You see, personal computers can communicate at 9600 baud, but only in a handshaking protocol. In these situations, if the receiving computer starts falling behind, it tells the transmitting computer to hold up. Then, after it processes the data already sent, it signals for more."

The proponents of
sofcasting believe that
no-cost
advertiser-supported
software and electronic
information can lead to the
mass proliferation of
computers.

Since sofcasts are receive-only (there's no way to tell the radio station to stop transmitting), the rate was reduced to 4800 baud, a speed most personal computers can comfortably handle without handshaking. For AM broadcasts, the rate was further decreased to 2400 baud. The slower pace delivers data more reliably in the relatively narrow bandwidths of AM radio. The faster, 4800 baud rate applies only to the wide channels found on FM broadcast bands.

To ensure that the data is received without errors, each file transmitted is surrounded with header and checksum information. The header contains a machine

code (IBM, Apple, Radio Shack, and so on), file length in characters, filename, and file format (text or binary). While receiving a file, the listening software calculates a checksum and compares it to the checksum transmitted by the radio station. If they match, then it assumes that the sofcast occurred without error.

Announcer Hardwick boasted that most sofcasts are received intact. "I want to make it work under the worst possible conditions," he stressed. "Nine o'clock at night, during the winter, over a 1,000-watt AM radio station. If it works there, it'll work anywhere."

Cable Television Link

The problems inherent in AM virtually disappear on FM radio and cable. Music sounds significantly better over FM and television appears crystal clear over cable, and sofcasts accrue similar benefits. In addition to clarity, cable television links open a wide door to other innovative applications of sofcasts.

"We'd like to produce cable simulcasts," emphasized Darland, Microperipheral's president. A simulcast (short for simultaneous broadcast) involves the transmission of a video production on a television channel with its corresponding sound also being carried over an FM frequency. Common applications include musical concerts in which the viewer can watch performers on a television channel and listen to the sound in high fidelity over a designated FM radio station.

"For our simulcasts," Darland explained, "we might give a programming tutorial on television and ship software on an FM band through a Shuttle Communicator. That way users could examine the software on their PCs while the television announcer demonstrates it."

Darland speculated that an FM band on cable television could be dedicated entirely to sofcasts. "Radio frequencies in the air are public property governed by the Federal Communications Commission. It may not be appropriate to fill the air with the hum of computer data. However, FM bands on cable are available for sale or lease. These are perfect for sending reams of data including weather maps, electronic magazines, demonstration software, pixel pictures, and other types of information

that can be accessed through a home computer."

The proponents of sofcasting believe that no-cost advertiser-supported software and electronic information can lead to the mass proliferation of computers in the same way that radio broadcasts of music have made stereo systems standard appliances in the home. Presently, they have amassed a library of 2 megabytes of public-domain software for distribution over the airwaves. Besides games and short utility programs, they intend to deliver interactive fiction, *Multiplan*-style templates, and, in general, any type of digital information that listeners ask for. Two days before the November election, for example, KAMT broadcast a caricature of Ronald Reagan in front of an American flag for Apple Macintosh owners.

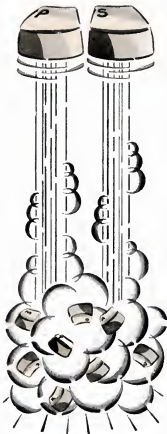
Telephone Queries

Although the Shuttle Communicator is used primarily for receiving data, it does have limited capability for two-way communication. In this capacity, it operates like a modem. The cable connecting the Communicator with the radio earphone jack is replaced by a cable that attaches to a standard telephone jack. (The other cable on the Communicator remains plugged into the computer's serial interface.) Characters are received at 1200 or 2400 baud, to be set by the software (the slower rate would be employed for "noisy" telephone lines). Transmission is limited to the keys on a touch-tone telephone. The touch-tone signals are relayed to the computer on the other end of the telephone line. That computer must convert them to a corresponding keyboard character.

Microperipheral has devised a bulletin board-type information service geared to queries by way of a telephone touch pad. For example, you would dial the number of the information service and attach the Shuttle Communicator to the phone line. The computer controlling the service would respond by displaying a list of menu options such as news, user groups, restaurant guide, help, and so on. Then, you can make a selection by pressing the right key on the telephone touch pad.

The developers of this service call it the Shuttle Express and offer it free of charge. It contains information on weather condi-

Macro Dynamos For the PC



Two popular macro processors, ProKey 3.0 and SmartKey 4.1, now updated, are running neck and neck. SmartKey 4.1 wins on price, but ProKey 3.0 offers more keystroke economy.

ProKey, the popular \$75 macro processing program that lets you type large blocks of text or multiple program commands with a single keystroke, has undergone a transformation. Now known as *ProKey 3.0*, the program offers a lot more features—and also, at \$129.95, costs a lot more.

The old *ProKey* has been a valuable part of my software tool kit for almost 2 years. When I saw the ads for *ProKey 3.0*, I was puzzled. What could RoseSoft have done to *ProKey* to justify a 73 percent price hike? And what about *ProKey 3.0*'s lean and scrappy competitor, Software Research Technologies's *SmartKey 4.1*, which offers many of the same features and retails for \$49.95? I put the two programs through their paces and found that both *ProKey 3.0* and *SmartKey 4.1* are worthy of three cheers and a brass band. If you don't have a keyboard macro program, you should do yourself a favor and go out and buy *ProKey 3.0* or *SmartKey 4.1*. You won't be sorry.

But what if you already have an older version of one of these programs? Both RoseSoft and Software Research Technologies are offering deals: you can move up

to *ProKey 3.0* for only \$35, or you can get *SmartKey 4.1* for between \$20 and \$29.95, depending on which older version you own. Both updated versions offer extra goodies, such as the ability to change defaults, to insert timed pauses into your macros, and to invoke macros from DOS batch files. Plus, in the case of *ProKey 3.0*, RoseSoft adds a badly needed on-line Help facility.

If you don't have a keyboard macro processor and the \$80 price difference between *ProKey 3.0* and *SmartKey 4.1* doesn't sway you decisively, you'll want to know the strengths and weaknesses of each program. So, let's look at macro processing in general and at how the two programs compare, feature by feature.

Macro Processing

What does a keyboard macro processor program do? Briefly, it sits in your PC's internal memory and allows you to change the way your other software interprets your keystrokes. For instance, you can assign frequently used text, such as business letter headings, to a single key or a keystroke combination, such as Alt-R. Or you can assign a series of program com-

mands to a key that makes the macro program center a report heading or build a frequently used spreadsheet model. The block of text or series of commands that comes to life when you press a single key is called a "macro," and the program that creates and executes macros is a "key-board macro processor."

Anyone who has used *WordStar* with the help of a macro processor can attest that macros greatly speed up a program with a complicated command structure. However, like any program that takes up residence in your PC's memory, a macro processor might prove to be incompatible with either your applications programs or with other resident programs, such as *RAMdisk* software and print buffer programs. For instance, *ProKey 3.0* unexpectedly locked up my keyboard when I used it with my print buffer program. And *SmartKey 4.1* made my *WordStar* screen unreadable when I used it with the print buffer. *SmartKey 4.1* also is subtly incompatible with BASIC. BASIC uses the Ctrl-Break key combination to stop execution of a program, and *SmartKey 4.1* uses the same combination to halt the execution of a macro. So, if you cancel a macro, you'll also abort whatever BASIC program you're running.

Neither macro processor is compatible with programs that completely take over the keyboard, such as *Samna Word*, *XyWrite*, and *Leading Edge*. *SmartKey*

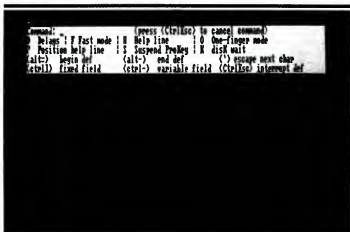


Figure 1: ProKey 3.0's help window lists all of the program's commands.



Figure 2: SmartKey 4.1's window prompts you to define keys.

ProKey 3.0

RoseSoft, Inc.
4710 University Way NE
Seattle, WA 98105
(206) 524-2350

List Price: \$129.95

Requires: 64K RAM, one disk drive.

CIRCLE 693 ON READER SERVICE CARD

SmartKey 4.1

Software Research Technologies, Inc.
3757 Wilshire Blvd., #211
Los Angeles, CA 90010
(213) 384-4120

List Price: \$49.95

Requires: 64K RAM, one double-sided disk drive, DOS 2.x.

CIRCLE 692 ON READER SERVICE CARD

4.1 does come out ahead when it comes to *Microsoft Word*. *ProKey 3.0* won't work with *Word* at all, while *SmartKey 4.1* will. To avoid such software conflict, you should check with the manufacturer about possible incompatibilities and then test the macro processor program with other software before you buy it.

Macro Magic

Macro mavens insist that the best way to create macros is to record them while you're actually using your applications

program. In other words, if you want a macro that would center a heading and put it in a boldface at a single keystroke, a good macro processor should be able to record the commands while you perform them. A macro processor must also allow you to create blank spaces within a macro that you can fill in when you play it back. *ProKey 3.0* and *SmartKey 4.1* can perform both bits of macro magic, although with slightly different twists.

With *ProKey 3.0*, you create a macro by recording a sequence of commands

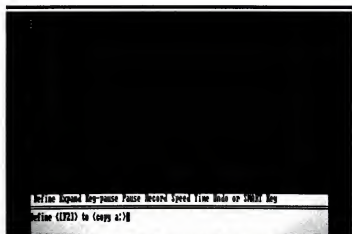


Figure 3: SmartKey 4.1's Smart key calls up a menu of Smart commands.

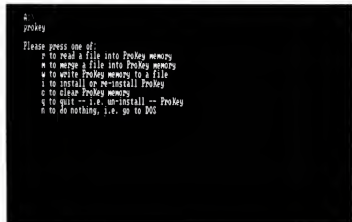


Figure 4: Here's ProKey 3.0's file maintenance menu.

while you're using your application. Once you've installed *ProKey 3.0* into memory, you power up your applications program. Whenever you want to create a macro, you type Alt-equal sign (=). *ProKey 3.0* lets you know it's gone into action by making your cursor fatter and by displaying a reverse video prompt in the upper left-hand corner of your screen that says, "Press Key to Define."

Next you press the key or the combined keystroke that will be the name of the macro. The *ProKey 3.0* prompt will now dis-

play the keys you've pressed, such as F10 or Alt-B, along with the word *TEXT*. If your macro is ordinary text, you type it normally and press Alt-hyphen (-) when you want to conclude the macro.

If you want to create something fancy, such as the fill-in-the-blank pause, you have to give *ProKey 3.0* some additional commands while you're recording the macro. If you couldn't remember the right commands with older versions of *ProKey*, you'd have to start leafing through your manual. But with *ProKey 3.0*, you type

Alt-slash (/) to summon the help window that lists all of the program's commands (see Figure 1).

Pressing Ctrl-right bracket (]) creates a "fixed-field" blank in your macro that will accept a certain predefined number of keystrokes. This key combination is useful for a macro that asks for a social security number and then fills in the dashes after you've typed in the proper number of digits. Similarly, pressing the combined keystroke Ctrl-hyphen (-) creates a "variable-field" blank that can be a different length every time you play back the macro.

Other handy commands include the reverse apostrophe (') key; *ProKey*'s Esc key, which allows you to use the original meaning of a redefined key in a macro; and the combined keystroke Ctrl-Esc, which allows you to cancel a macro you're recording or interrupt macro playback.

Command Switches

The "command switches" at the top of the command menu are new in *ProKey 3.0*. You can turn these switches on or off at any time, either within a macro or directly from the keyboard. The Delay switch allows you to insert a timed pause (ranging from 1/10 second to 99 hours) into your macro. This pause compensates for programs that won't accept keystrokes at *ProKey 3.0*'s top speed of 1900 words per minute. It could also be used to help automate late-night data transfers that help you take advantage of low nighttime telecommunications rates.

If you want *ProKey 3.0* to shift into low gear and type at only 180 words per minute, you can turn off its fast mode by using the command menu. The "disk wait" switch orders *ProKey 3.0* to refrain from playing back macros until your disks stop spinning. This option is necessary for programs that won't accept keyboard input while the disk is spinning.

Handicapped PC users who have difficulty pressing more than one key at a time will benefit from *ProKey 3.0*'s one-finger mode. When you turn on this switch, *ProKey 3.0* lets you sequentially enter keystroke combinations. For instance, you could perform a warm boot by pressing Ctrl and then Alt and then Del, instead of simultaneously pressing all three keys. Other *ProKey 3.0* options allow you to get

```

      Inner ID: 10.0.0.0 Copyright (c) 1984 FBN Software
      SmartKey II Plus Definition Utility
      A Product of Software Research Technologies, Inc.

```

```

Exit to system
List the contents of a definition file

SmartKey Operations:
Save the current definitions to disk
Load a new set of definitions from disk
Merge a new set of definitions from disk
List the current definitions
Clear the current definitions
Move a definition to a new key
Change SMART key, SuperShift or Expansion delay
Unload SmartKey

Choose:

```

Figure 5: SmartKey 4.1's file maintenance menu offers more options than ProKey 3.0's.

Feature-by-Feature Comparison

List Price	ProKey 3.0 \$129.95	SmartKey 4.1 \$49.95
Specifications		
Memory usage	8K + buffer	7K + buffer
Size of buffer	1K to 40K	40 bytes to 60K
Maximum number of macros	About 300	About 400
Maximum characters per macro	About 10,000	About 30,000
Features		
Can send keystrokes to application while recording macro	Yes	Yes
Can record macro without sending keystrokes to application	No	Yes
ASCII data file available	Yes	Yes
Macro can invoke itself	Yes	Yes
Macro can invoke another macro	Yes	Yes
Macro can define another macro	Yes	Yes
Fixed-length pause	Yes	Yes
Variable-length pause	Yes	Yes
Speed up or slow down playback	Yes	Yes
Insert timed pause into macro	Up to 99 hours	Up to 99 seconds
User-definable extra shift	No	Yes
Can invoke macro from batch file	Yes	Yes, (only Alt-F10)
Copyable		
Print macros available	Yes*	Yes
Can change size of definition table	No	Yes
Can change command keys	Yes	Yes
Can temporarily turn off playback	Yes	Yes
Can change entire keyboard layout	Yes	No
One-finger mode	Yes	No

(*The ProKey 3.0 distribution disk is copy protected. But, if you sign and return a license agreement, RoseSoft will send you an unprotected version.)

rid of the program's help prompts, change the position of the help line, and temporarily suspend all macro playbacks so you can use the original meaning of your keystrokes.

The Smart Approach

SmartKey 4.1 offers many of the same features as *ProKey 3.0* but takes a different approach to macro processing. It offers more on-screen help and lets you decide if you want to pass your keystrokes through to your program while you're recording a macro.

SmartKey 4.1 dubs its main command key the Smart key. The default Smart key is the reverse apostrophe (') key. If you prefer, you can designate any other key as the Smart key with the program's set-up utility. When you press the reverse apostrophe key, you see a reverse video window at the bottom of the screen (see Figure 2). *SmartKey 4.1* calls this the Smart window. This window, similar to *ProKey 3.0*'s help menu, prompts you to press the key that you want to define. You cancel the process by pressing the Smart key a second time.

If you wish, you can now create the macro within the Smart window, without sending any keystrokes to your program. As you type, the names of the keys appear in the window. For instance, if you press 1 on the numeric keypad, <[K1]> appears in the window. To correct a mistake, you use the Backspace key to erase the last keystroke name.

If you want to send your keystrokes to your applications program while *SmartKey 4.1* records them, you have to put the software into record mode. You do this by pressing the Smart key once again, which calls up a menu of Smart commands (see Figure 3).

One of the Smart commands is Record, which cleans the Smart window off your screen and sends the cursor back to your applications program, but in greatly fattened form, to remind you that something unusual is going on. *SmartKey 4.1* records all of your keystrokes until you press the Smart key again, which reopens the Smart window and allows you to review your macro. You can add more keystrokes to the macro, issue another Smart command, or conclude the macro by pressing the

IBM PC and compatibles. They require a minimum of 192K RAM, two disk drives, and an Epson-type dot matrix printer with Graftrax. Lighting Technologies also recommends the installation of an Intel 8087 math coprocessor to speed up the calculations.

According to Marty McCloskey, director of client services for Lighting Technologies and chairman of the IES Computing Committee, the 8087 can reduce average analysis time by four to ten times. Without the processor, the programs utilize an 8087 software emulator that permits uninterrupted use of the programs. The programs were reviewed without benefit of the 8087 chip and no complications were encountered, but at \$175 uninstalled and \$250 installed, investing in a coprocessor is not out of the question.

Both *LUMEN\$* and *LUMEN-MICRO* come on multiple diskettes (*LUMEN\$* has four and *LUMEN-MICRO* has six). You must frequently switch program diskettes during the analysis section of the programs, but provisions have been made for the installation of the programs on hard disks.

The two programs are structured similarly. Each includes a data input program, a photometric database manager, and an analysis program. The major difference is price. *LUMEN\$* can be purchased for \$495 while *LUMEN-MICRO* runs \$2,660. If my math background still serves me, *LUMEN-MICRO*'s two extra diskettes work out to more than \$1,080 apiece!

The *LUMEN* duo are descendants of a well-known artificial lighting design pair for mainframes: *LUMEN II* and *LUMEN III*, two of the most respected computer-aided lighting-design tools available. These programs were initially available through Computer Sharing Services, Inc. (CSS), a time-sharing service in Denver, Colorado.

David DiLaura, coauthor of the original *LUMEN* and a principal of Lighting Technologies, helped rewrite the mainframe programs to run on a PC. DiLaura, described by one consultant as a "guru" of artificial lighting systems modeling, chairs the IES Calculation Procedures Committee. He is also a practicing lighting engineer and teaches lighting programs at the University of Colorado at Boulder.

How They Work

Specific information is needed to accurately analyze any lighting system. Some of this information will recur from analysis to analysis. For example, troffers (commonly known as fluorescent lights), seem to be the mainstay of lighting design. Whether the design is for a 15 by 15-foot

Lighting design requires combining a complex series of numerical calculations with practical considerations.

office or a 100- by 150-foot production room, the data for each individual troffer, such as power consumption, luminance, and so on, remains constant. To avoid repetitive entry of similar data, *LUMEN-MICRO* and *LUMEN\$* utilize a photometric database manager. The basic data (photometrics) of the fixture (luminaire) can then be recalled into any lighting system model simply by specifying the luminaire number. *LUMEN\$* comes complete with a database containing the reference luminaires as described in the *IES Reference Handbook*. The pre-entry of these IES

luminaires allows the designer to begin analyzing systems almost immediately, without having to first enter the photometric data into a completely new database.

Both *LUMEN\$* and *LUMEN-MICRO* utilize input programs. You enter data for lighting analyses onto an electronic worksheet consisting of a list of specifications followed by blank spaces for data entry. (The PC versions are the first *LUMEN* programs to use worksheets instead of prompts as the mainframe *LUMENs* do.) Worksheets are stored as data input files so that they may be rerun or revised at a later date. Prior to analyzing the system described on the worksheet, the programs check the worksheet for errors and flag them for correction. If you run the programs on a hard disk, you can request multiple analysis with different input files, allowing convenient unattended batch runs.

Editing functions, such as First Page, Line Up, Line Down, Page Up and Page Down, are assigned to the PC's special function keys. The cursor moves from cell to cell, and the programs do not allow placement of data anywhere outside of specified blanks. I was surprised to learn that the numeric pad keys did not control the editing functions, but, after working

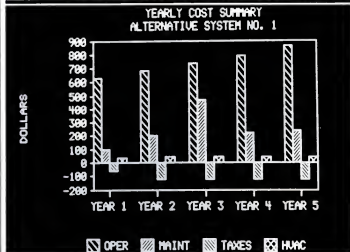


Figure 2: A sample of a file transferred from *LUMEN\$* to 1-2-3 to take advantage of 1-2-3's graphing capabilities.

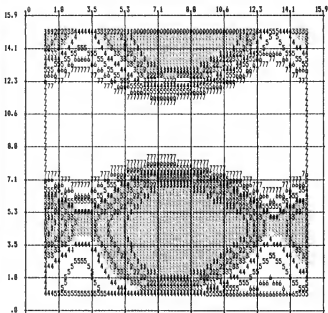
LUMEN

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QUANTITY PLOTTED: SPHERE ILLUMINANCE THAT PRODUCES EQUIVALENT VISIBILITY
PENCIL TARGET - CONCENTRIC RINGS @ 25 DEGREE VIEWING ANGLE

SCALE: 1 INCH = 3.0 FEET CRITERION: LESS THAN 35.00

VALUES:	SYMBOL:
15.000	0
20.000	1
25.000	2
30.000	3
35.000	4
40.000	5
45.000	6
50.000	7



This more traditional contour plot indicates the distribution of ESI footcandles (including a quality measurement). The white areas are adequately lit, while the numbered areas designate a range of ESI footcandles surrounding the 35.00 cut-off point. The gray areas are so far below acceptable lighting levels that they have not been given values.

with the program, I came to agree that, since most of the data it deals with are numeric, the pad is better-suited for data entry.

Analysis

From the worksheet, both *LUMENS* and *LUMEN-MICRO* allow you to select the type of analysis to be done and the type of output. Both provide basic measurements of light levels within a room, including zonal cavity horizontal and/or vertical illuminance analyses. They both allow analysis of rectangular, octagonal, and circular rooms.

LUMEN-MICRO can also analyze room lighting conditions by a method known as equivalent spherical illumination (ESI), which was developed by DiLaura and acknowledged by the IES. Traditional analysis methods base calculations primarily on luminance levels. For example, the IES determined that the task of reading typed copy on a sheet of white, flat-finished paper required, let us say, 100 footcandles. A fixture producing 100 footcandles directly above the reading area would satisfy this criteria, even though the glare created by the light source's angle might make reading impossible. ESI adds qualitative analysis to help confirm that not only will an area on the desk have 100 footcandles shining on it but that the light will be thrown at an angle appropriate for the task.

Economic analyses, including initial costs, operating costs, maintenance costs, and depreciation of the system are also available. Lighting systems produce large amounts of heat, which can have a major impact on the heating and air-conditioning in a building. Many buildings now have energy bills running into the thousands of dollars every month, so it's important to provide an analysis of the heating and air-conditioning impact of any present or prospective lighting system.

LUMEN-MICRO's best feature is its output. Using a standard Epson-style dot matrix printer, a designer can create "pictures" of the results of a lighting design. Besides standard contour plots, using numbers to represent light values at locations on a requested geometric plane, *LUMEN-MICRO* will actually simulate what a room surface—a wall, ceiling, or



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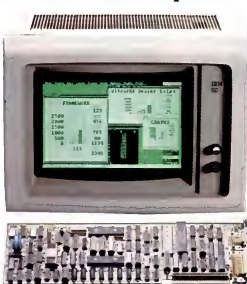
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*Multiplan™, Word Star™, Word Perfect™, with FREE - Lotus 1-2-3 driver for 132 columns. **IBM PC Compatible. ***UltraPAK-S, serial port and battery backed clock not available.

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Spreadsheet	80 Characters x 25 Lines 132 Characters x 44 Lines	80 Characters x 25 Lines NA
Communications	2 Serial Ports (1 Std. 1 Optional) connect modem, mouse, 1 Centronics Parallel Port (not print pool)	NA 1 Centronics Parallel Port
Word Processing	IBM Compatible	Standard
Database	Optional 384K System Memory Optional IBM Disk Controller Ream Disk Software	NA NA
Clock/Calendar with battery	Standard	NA

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UltraPLOT™ Graphics Software	Optional	NA

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LUMEN

floor—will look like when lit with a particular system (see Figure 1). Engineers and architects are no longer limited to describing the way the final systems will look in a client's hotel lobby or office building. They can whip out this printout and show the dark and bright spots on any surface in a specified room.

LUMEN-MICRO's best feature is its output. Using a dot matrix printer, a designer can create "pictures" of the results of a lighting system.

Comparatively, **LUMENS** has a rather sparse output. Analysis results are printed in standard, tabular form. Contour plots or wall simulations are not available. On the other hand, enhanced graphics output, such as depreciation bar graphs, are possible using the data-conversion utility for 1-2-3 (see Figure 2).

Because both programs deal primarily with artificial, electrical, interior lighting systems, daylighting (use of sunlight in lighting system designs) is not an option, according to DiLaura. This, he says, is mainly owing to lack of present standards and the minimum of daylight use in the majority of lighting designs.

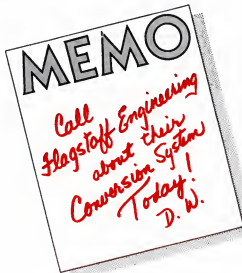
LUMENS and **LUMEN-MICRO** are tools written for experienced engineers, architects, and manufacturers. The brief documentation covers the simple processes of program operation. It does not teach the skills required to design lighting systems, but rather, tries to help experienced designers produce effective systems.

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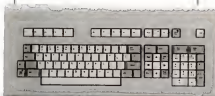
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Old-time salesmen were full of smooth talk and bluster, lugging worn and bursting sample cases door to door and spreading out their wares before anyone who would listen. Snake oil sellers noisily hawked their miracle tonic on the town green or the nearest busy street corner.

Today, salespeople can be characterized more by their planning and organizational skills than by their hustle and sales pitch. They want to target potential clients and plan the most efficient method to make each sale. In fact, at least half a dozen software packages have been designed recently to help salespeople clinch the big deal. One of the more sophisticated and powerful systems is *The Sales Manager*, Version 2, from Market Power Computer Innovations, Incorporated, of Rough & Ready, California.

Tracking Customers

The Sales Manager's primary function is tracking prospective and established customers. It also records and reports on sales, expenses, commissions, quotas, and sales personnel. *The Sales Manager's* database includes separate physical files for customers, prospects, "suspects" (early sales leads), personnel, sales items, and expense items.

The Sales Manager's customer, prospect, and suspect files provide space for the information you would expect: the customer's name, address, phone number, and the name of a contact person. In addition, space is reserved for a second phone

The sales game today requires more than a rugged sample case and a miracle tonic. The *Sales Manager* helps you track clients and record sales, expenses, commissions, and more.

number, a territory designation, a credit rating, and the current terms of sale. *The Sales Manager* also tracks products purchased and provides for two miscellaneous dollar amounts, two miscellaneous dates, and a few other items.

The prospect file differs slightly from the customer file. *The Sales Manager* includes fields for recording competitors and for estimating the probability of a sale. Some fields in the customer file, such as current terms of sale, are not appropriate for prospects and are not included in the prospect file. Similarly, the suspect file contains less information, as is appropriate for an early lead.

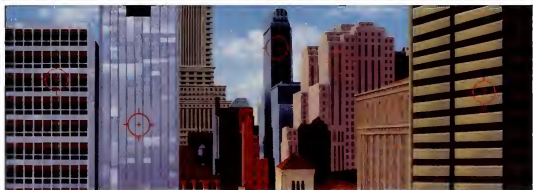
Forty-character memo fields are included in both the suspect and prospect file records. A forty-character limit is often far from adequate when a big deal is pending, and so *The Sales Manager* has a separate file of up to 36 screens for mixed general comments and date-oriented information for each customer.

The Sales Manager includes an expense recording and reporting feature that tracks expenses by both customer and salesperson. Oddly, however, the program retains only whole-dollar amounts. If, for instance, a salesperson includes \$19.38 for mileage in an expense account report, *The Sales Manager* records only \$19. The loss of 38 cents is unimportant if the objective is to analyze expenses or compare actual expenses to planned. But if the objective is to pay the salesperson, the situation changes. Since *The Sales Manager* records only whole-dollar amounts, it won't replace an existing expense approval and payment system.

Market Power is aware of the no-cents limitation and expects to correct the problem. The company claims that a new version, which records both dollars and cents, will soon be available.

Even with its limitations, *The Sales Manager* does have some useful expense management features. A spreadsheet-like display almost instantaneously summarizes expenses by salesperson. A similar spreadsheet allows you to enter a plan by months and by expense categories. These reports allow you to compare actual expenses with planned expenses quickly and easily. Because the expense summary records are updated every time a new expense is entered, data entry is sometimes slow, but analysis and reporting is lightning fast.

The Sales Manager's spreadsheets, incidentally, are more limited than ordinary spreadsheets, such as those in 1-2-3



THE SALES MANAGER

or *VisiCalc*, because they allow only entry and display of data. Although horizontal and vertical totals are automatically updated as information is changed, you cannot otherwise manipulate the numbers, sort them, or even assign meanings to columns and rows. *The Sales Manager* is not intended to replace your favorite spreadsheet program.

Sales entry is similar to expense entry.



The Sales Manager, Version 2
Market Power, Inc.

11780 Rough & Ready Rd.
Rough & Ready, CA 95975
(916) 432-1200

List Price: \$575; \$10 shipping charge
Requires: 256K RAM, two double-sided disk drives or one double-sided disk drive and a hard disk.

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You identify the customer, the salesperson, the products and quantities sold, and the selling price. As sales are entered, corrected, or updated, you can override commission rates or amounts and quota contribution rates or amounts. Once again, the program tracks only whole dollars. As with expenses, *The Sales Manager* summarizes sales by product and by month in a quasi-spreadsheet fashion; it allows entry of a sales plan by salesperson, product, and month and reports actual versus planned expenses.

Calculating Commissions

The Sales Manager calculates and reports three different kinds of commissions. It allows you to store a table of commission rates, which then permits you to automatically calculate commissions. Different rates may be established for each product line and will remain in effect until changed. Alternatively, you can enter

either a specific dollar commission amount or a special commission rate at the time the sale is made. Commissions are calculated and reported along with a commission plan by salesperson by month, which is similar to expense and sales reporting. Because only whole dollars are retained, *The Sales Manager* won't be useful for commission payments, even though its report writer is powerful enough to format and print checks.

Not all commission plans will fit *The Sales Manager's* mold. For instance, some plans are based on variable rates that pay more (or less) as monthly sales increase. Other plans include bonuses when a specific monthly sales level is met, when two products are sold together, or when specific target accounts are closed. It is common for commission plans to pay different rates for above-quota sales. If you use any of these plans with *The Sales Manager*, you will need detailed manual

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(Bill Machrone is the editor of PC Magazine.)

PC Magazine
November 27, 1984

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Computers & Electronics Magazine
November 1984

recordkeeping as well as tedious hand calculation because you will have to enter the commissions separately for each sale.

Quotas and each salesperson's progress toward quota are calculated in a manner similar to the process for commissions. At sales entry time, the contribution of each sale can be overridden as necessary. Summary spreadsheets of quotas and sales toward quotas are available by salesperson, product, and month. Again, only whole dollars are retained.

The expense, sales, commission, and quota planning spreadsheets are more useful because they can handle both future and past years' plans. Thus, you can use the current plan for comparison with actual expenses and hold the prior year's plan for analysis while you are building the coming year's plan.

The last major feature of *The Sales Manager* is basic personnel recordkeeping. A salesperson file allows storage of

name, address, phone, social security number, vacation time, major accounts, earnings, and up to 180 characters of general memoranda.

The Sales Manager's expense, sales, commission, and quota planning spreadsheets are useful because they can handle both future and past years' plans.

A Good Installation

The Sales Manager's installation procedures are excellent and are thoroughly explained in the manual. You install the system by bringing up DOS, placing the master system disk in drive A: and the DOS disk in drive B:, and typing "in-

stall." A batch file then copies DOS onto the master system disk and executes *The Sales Manager's* main program. The main menu includes an install option that allows coded entry of product lines, sales representatives, and a host of other user-selected codes. The installation menu also allows entry and modification of commission rates and passwords and gives access to two additional screens of miscellaneous system options.

During the installation process, you can set up and modify several reference tables. The salesperson reference table, which is independent of the personnel file, allows you to use codes or initials in place of names, and records those codes. You can also set up codes for order types, expense types, territories, competitors, tax categories, credit categories, and so forth. The default rate of payment for personal car mileage is recorded. Up to ten product lines can be defined with up to 20 product

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CIRCLE 164 ON READER SERVICE CARD

THE SKY'S THE LIMIT

Zosma, without even a paper cross-reference to their more familiar names. While Zubenelgenubi is a whacky and romantic thing to call a star, it is not what 99.44 percent of amateur astronomers call Alpha Librae. So at least as far as stars are concerned, *TellStar*'s identify function is of little practical use.

Looking for Mercury

On the other hand, *TellStar* really shines when looking for planets. Finding Mercury in the sky is an unholy hassle, especially in a city where your horizon is dirty and cluttered. Mercury, while a fairly bright planet, is always close to the sun and never in an especially dark sky. Finding it is rough unless you know exactly where to look.

I knew that Mercury is a morning star for the first half of January. I also knew that, where I live, the sun rises about 7:15 a.m. at this time of year. So I requested a display of the southeastern sky at 7 a.m., and there was Mercury, just a bit east of Antares, in Scorpius. The display showed it fairly close to the horizon but quite bright, and it gave me a good idea where to look based on the position of familiar constellations.

On a cold January morning I hopped into my car in search of a flat horizon. Looking southeast over a nearby cornfield, I saw against pink dawnlight a bright star to one side of Antares. It was no longer anything like night, and all but the brightest of the real stars were dimming out. Had I gone earlier for darkness, Mercury would have been hidden by trees along the horizon. Since *TellStar* told me where to look, I could find it even in a mottled and pinkish sky.

The TellStar Utilities

In addition to its display function, *TellStar* performs a number of nondisplay functions using the star and planet tables. It can give you the position, magnitude, and rise and set times for any solar system object without having to calculate positions for all 247 stars. Another *TellStar* utility converts equatorial to altazimuth coordinates and back again. A more arcane utility provides precision adjustments from epoch 1950 coordinate tables to current coordinates. This allows you to

use charts and star catalogs drawn up for epoch 1950 to find objects not included in *TellStar*'s tables. The Earth's equatorial wobble renders star charts inaccurate over a period of years, but tables are generally issued for "epochs" only every 30 years. You can either do the interpolation yourself on paper or let *TellStar* do it—I'm for the computer every time.

TellStar can also convert between ecliptic and equatorial coordinates. Eclip-

Tellstar really shines when looking for planets. Finding Mercury is an unholy hassle, especially in a city where your horizon is dirty and cluttered.

tic coordinates view the universe from the sun's perspective rather than the Earth's. You're unlikely to use them unless you are very deep into your astronomy.

A Lighter Journey to the Stars

For all that *TellStar* can do, it expects a fair amount of sophistication from its users. It shows and it tells; it does not explain. With some delight, I can report that *Journey to the Stars* can do what *TellStar* can't: teach you a little bit about the stars and the constellations. It has a table of 1,400 stars, and it displays them on your computer's screen. It does not deal at all with the sun, moon, or planets, nor does it offer rise times, set times, or coordinates for the stars.

What *Journey* excels at is teaching. *Journey* can take a beginning observer and explain the fundamental concepts governing the apparent motions of the stars from the Earth. It teaches the names of the stars and the constellations and how to find them in the skies.

To install *Journey to the Stars*, you must run a program that enables or disables color (for using a monochrome monitor) and enables or disables sound. The sound is used only to accompany the pointer for the Find That Star drill. It is amusing the first few times you hear it, but I was very glad I could turn it off.

Unlike virtually every other educational program I have reviewed, *Journey* includes a tutorial program, *JSTUTOR*, that teaches you how to use the *Journey to the Stars* program itself, explaining its commands and the various courses (called "journeys") it offers. Once you run *JSTUTOR*, you don't need to flip through the manual very much. *JSTUTOR* is beautifully designed and can be appreciated by fairly young children. I would not hesitate at all to put it in the hands of a bright 8-year-old.

You run the main program by typing *JSTARS*. It is divided into ten journeys, each of which is a mini-course in some aspect of backyard astronomy. Journey 1 is *JSTUTOR*, which may be run from within *Journey*'s main menu. Journeys 2 and 3 are the real meat of the program: Constellations and Bright Stars. Journeys 4 and 5 present the stars for the northern and southern hemispheres. Journeys 6 through 9 present the stars as they change through the four seasons, winter, spring, summer, and fall. Journey 10 explains how to locate stars and constellations through the use of right ascension and declination coordinates.

No Lines

I remember being very young and taking my copy of *The Golden Book of Astronomy* out in the backyard and trying to find Leo the Lion. Unlike the crisp charts in the book, the skies showed no helpful lines between the stars. I was able to find Leo after awhile, but I kept wishing that God would just turn on the lines for a few seconds so I could get my bearings; after that I would gladly muddle through on my own.

Journey to the Stars has 48 constellations in its tables. These are only about half of the constellations actually in the sky, but many constellations are so faint that they contain no recognizable patterns. All of the bright and easy constellations are here, including the 12 constellations of the zodiac.

You can display any of these 48 constellations on the screen. No lines connect the stars, but if you cannot bring yourself to see the water snake in Hydra (I confess that one escapes me as well), pressing the Enter key projects a bare-bones outline of

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CIRCLE 156 ON READER SERVICE CARD

THE SKY'S THE LIMIT

the major figure between the stars. This is easy enough for water snakes, but the representation of Libra suggests nothing of scales, and the Big Bear seems more a collapsed cubistic *Pac-Man*.

Journey also includes a drill/game called Name That Constellation. The program picks a constellation at random and displays it without lines. You try to recognize the pattern on your own and type the name into the screen. The program keeps track of how many you've gotten correct, and when you get one wrong it jogs your memory by drawing the telltale lines between the stars and telling you the correct name.

Curses, Zubenelgenubid Again!

The Bright Stars journey shows you how to find 42 of the brightest stars. If you choose, it will then drill you by playing Name That Star: Journey draws a circle around a star on a starfield (no constellation lines to help here), and you must enter the name of the star.

Unfortunately, Name That Star has a familiar problem: you have to type in the star's ancient name. The Arabs said Alnilam; I say Epsilon Orionis; *Journey* expects Anilam. Much to its credit, *Journey* always gives the modern designation alongside a star's ancient name; but when push comes to shove and the drill starts, it accepts only the ancient name.

You can also find that star when displaying the seasonal star charts. For this drill, *Journey* cheerfully commands, "Find Cursa!" You then steer a little pointer (called a UFO—arrgh!) over to Cursa with the arrow keys and press the Ins key to register your choice. If you have never heard of Cursa (join the club—it is not one of the 42 brightest stars from the previous drill), *Journey* moves the pointer to the proper position and corrects you: "Sorry, you picked Zaurac. Here is Cursa."

I scored badly in this drill, having been asked to locate stars with names such as Albena, Kochab, and Shedir. Finally I was told, "Locate Zubenelshemali!" I figured, no problem—but when I moved the UFO confidently to the furthest corner of the screen, I was scolded: "Sorry, you picked Zubenelgenubi. Here is Zubenelshemali."

I'll get it right one of these days.

Complaints

Considering what passes for software these days, both of these programs get very high marks. Both are remarkably bug-free. At one point, *TellStar* scrolls up the entire graphics screen one line after you enter a text response, which loses part of the star display off the top of the screen. *Journey* looks completely clean.

My worst complaint against both programs focuses on their emphasis on

South America) I would, however, gladly suffer a reasonable increase in processing time in exchange for a more sophisticated projection that would eliminate much of this distortion.

Journey to the Stars has an overrigid command structure. Once you begin playing Find That Star, you have only two options: continue playing or exit the display to the main menu. Furthermore, once you move the view with the arrow keys



ancient names. I built my first telescope at 13 and have a pretty good working knowledge of the skies, but it does not and will not include memorizing hordes of quaint and bizarre names such as Cursa, Zaurac, and Zubenelgenubi. There is a systematic and universally used designation system for the two or three thousand brightest stars. It uses the generic form of the constellation that contains the star and a Greek letter that roughly indicates its magnitude rank within the constellation. Thus, Alpha Orionis is the brightest star in Orion, and so on. For fainter stars, ordinary numbers are used, and the ranking is according to increasing right ascension. Almost everyone uses this system.

To best serve amateur astronomers and other students of the skies, both programs should recognize both the ancient and modern naming systems. I know that it can be done, and I hope that both programs will incorporate the necessary changes in future releases.

TellStar's sky displays are needlessly small and plagued by an irritating distortion toward the top of the screen. Any time a spherical area is displayed on a plane, there tends to be some distortion, but using a mapmaker trick or two can minimize this. *TellStar*'s projections are Mercator-style (you know, like those world maps in which Greenland appears as large as all of

from the standard seasonal view, you can no longer play Find That Star. This may be a bug or it may be a feature, but whatever the intention, it would be easy to avoid and should be changed.

However, that's about where it ends. What's most important to emphasize is that these programs are fun. If you are already an amateur astronomer, *Journey to the Stars* will be old hat, but *TellStar* will become absolutely indispensable for planning planetary observation and photography. *TellStar* also provides a tremendous bonus for astronomers who own a Dobsonian telescope: It gives, for all objects, altazimuth positions (heading and elevation), which are the only kind of coordinates a Dobsonian mounting understands. Odyssey owners, rejoice! Dial-and-find astronomy is within your grasp!

If you are curious about the stars but never took time to learn the lore of the skies, *Journey to the Stars* is an inexpensive and enjoyable way to start. Much more than *TellStar*, *Journey* encourages you to "poke around" without making you feel as if you're in way over your head.

And pretty soon, having mastered *Journey to the Stars*, you'll be out there under the sky pulling on Leo's tail.

Faster, in fact, than you can say "Zubenelgenubi!" ■

THE SALES MANAGER

groups in each line. *The Sales Manager* doesn't track sales by individual part number, but can separately track, for example, the sales of gilded bathtubs apart from enameled ones. Default commission rates and quota contribution rates can also be entered into tables and can vary by product group.

Although the system does not use color, the installation procedure includes a color monitor option. According to Market Power, the option was installed in an effort to eliminate problems that users with inexpensive color monitors were having with electronic snow. Market Power says that color support is planned for the future.

An Unusual Option

The installation procedure, unusually, also allows you to choose between two data entry procedures: You can opt to press the Enter key either after entering every field or after you have entered partially filled fields. Users who, like me, use several programs on a daily basis might find it hard to remember whether or not the Enter key is needed for the program they're working on. *The Sales Manager* allows you to pick the data entry method that you find easiest to remember. More software programs should include this option.

The Sales Manager supports a password that gives the boss access to the entire system, including password maintenance. *The Sales Manager* also permits you to create passwords for sales personnel that allow each salesperson access only to his or her own data. Or, the system can operate without password protection. I think *The Sales Manager* would be improved if it offered additional levels of security, particularly one for clerical personnel.

The installation procedure allows you to relocate all files and programs to any other floppy disk or hard disk. Relocation allows users to move files and programs as the database grows and also allows you to use *The Sales Manager* with a hard disk. Unfortunately, Market Power's copy protection requires the original master disk to be in drive A:, so users who have hard disks must still handle floppy disks. A backup master disk is included with the system.

The Human Interface

The Sales Manager includes a powerful and effective help facility. As with most newer software, you obtain help by press-

The Sales Manager's help screens are intelligent; they provide help pertaining to the item indicated by the cursor. Most important, they're fast.

ing the F1 key. *The Sales Manager*'s help screens are intelligent; they work from anywhere on any screen and provide help pertaining to the item indicated by the cursor. And, most important, they are fast. *The Sales Manager*'s help screens never

failed to be useful when I wanted to use them, but they are not a replacement for the manual.

One of the most powerful uses of the help facility is in the entry of codes. Suppose, for instance, you are entering a new customer and have to insert a salesperson's code. If you can't remember the right code, just locate the cursor on the code field and press F1. The result is a list that shows the names of salespeople and their codes.

Other operating constraints are less appealing. For instance, cursor movement through the data entry screens is strictly left to right, one line after the next. If a data entry clerk is working from a prepared form, all will be well. But if the clerk is working from a mess of uncoordinated notes—which is often the case—then the rigidity of this arrangement can make data entry difficult, particularly on screens that

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THE SALES MANAGER

logically flow from top to bottom.

The *Sales Manager* uses codes to speed data entry and help eliminate errors. Unfortunately, the codes are sensitive to letter case. For example, if my salesperson code is "JBY," *The Sales Manager* won't recognize me as "jby." This is an elementary error that Market Power should have corrected long ago. Perhaps it will be fixed in the new version of the program, scheduled for release this spring.

The Name of the Game

Surprisingly, *The Sales Manager* offers no automatic way to convert a suspect into a prospect or a prospect into a customer. Instead, you are required to delete and re-enter the records. Although this is not a critical problem, the oversight is surprising because creating new customers from old prospects is what the marketing game is all about.

The Sales Manager should also allow you to change field names on the screen. A field named "Dollars 1," for instance, is much harder to understand than the same field renamed "Year-to-Date Sales." Understandable field names are particularly important when data entry is done by clerical staff or when the system is used by managers with little or no sympathy for software restrictions.

Despite these gripes, I believe *The Sales Manager* has a relatively good user interface. With just a few exceptions, the system is reasonably fast, even when you're using floppy disks. The system's screens are well organized and readable; error messages are clear and understandable. *The Sales Manager* saves records only when it needs to and warns you before destroying any data. After a little practice, the system is easy to use and most people will be happy with it.

Report Capabilities

Like many systems, *The Sales Manager*'s reports are formatted according to specifications stored in report files, with one file per report. Market Power calls these files "formats" and labels them with name extensions. The DOS filenames do double duty as report names. Any report can be directed to the screen, to a printer, to a serial port, or to a file.

The Sales Manager comes with a set of

54 standard reports that are formatted for both 132-column and 80-column printers and for display on the screen. *The Sales Manager* can report on customers, pros-

Surprisingly, The Sales Manager offers you no automatic way to convert a suspect into a prospect or a prospect into a customer. Instead, you must delete and re-enter the records.

pects, suspects, personnel, expenses or sales, and can produce labels and form letters.

Controlling the sequence of your reports is relatively easy. You select the

sequence when you choose a report. You can obtain customer reports, for instance, in either alphabetical order by customer name or in numerical order by customer number.

The Sales Manager's record selection capabilities are powerful; they allow you to create complex criteria for extracting data. Almost any field can be used for selection. Criteria include individual listed values, groups of values, ranges, blanks, nonblanks, or all records. Both *and* or relationships are allowed. The system supports date and dollar as well as character value selections. *The Sales Manager* can search for values buried within alphanumeric fields and use those values as selection criteria.

In addition, you have the ability to write your own formatting files and create your own reports in the process. Using *WordStar* or any text editor that is capable of saving an ASCII file, you create a

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(C) Accessible Tables:	40	10
Password Security:	Yes	No
User-Definable Data Entry Rules:	Yes	No
Automatic Key Index Maintenance:	Yes	No
Data Dictionary:	Yes	No
Number of Relational Operators:	6	2

R:BASE 5000

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Application Compiler ¹ :	Yes	No
Can Directly Access Program Files From:	Lotus 1-2-3 pfs:file R:base 4000 dBASE II	dBASE II
Pre-Defined Macros:	Yes	Yes

A COMPLETE SET OF OPTIONS

	R:BASE 5000	dBASE III
Run-Time Module ^{1,2} :	Yes	Yes
Multi-User ² :	Yes	No
Clout [™] Natural Language:	Yes	No

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CIRCLE 102 ON READER SERVICE CARD



screen (see Figure 1). The other sequence illustrates a walk through a "wireframe" supermarket. I had to use 513 images for the supermarket sequence to illustrate just a one-quarter turn around the market. The wireframe supermarket (with 128 wireframe images) takes 10 minutes to render (see Figure 2). A full sweep of the supermarket would require nearly 100 hours of computation time, which would be prohibitively expensive. For both sequences, I used a combination of Cubicomp's CS-5 Graphics System (Cubicomp has since

Until the advent of computer animation, each frame had to be drawn, colored, and photographed by hand.

updated this system and changed its name to Polycad/10) and the *Lumina* paint program from Time Arts Computer Graphics of Santa Rosa, California.

These two sequences typify some of the computer animator's dilemmas. The more images you generate to create a sequence, the more fluid the motion appears. But to achieve more motion you need more computing time, memory, and storage, and the display complexities and the overall costs soar. I am constantly looking for new hardware/software combinations that will reduce the expense and improve the effect of animation.

The Illusion of Movement

Computer graphics animators have three hurdles: They must *create* the sequence, *display* it, and, finally, *present* the sequence by transposing it to another medium.

The simplest way to create animated sequences on the PC is to use BASIC. For example, you can draw a circle, store it, and recreate the same circle at a slightly shifted location. By performing the same step over and over, you create a sequence of circles. Displayed quickly enough, these images give the illusion of movement.

Graphics software packages also sim-

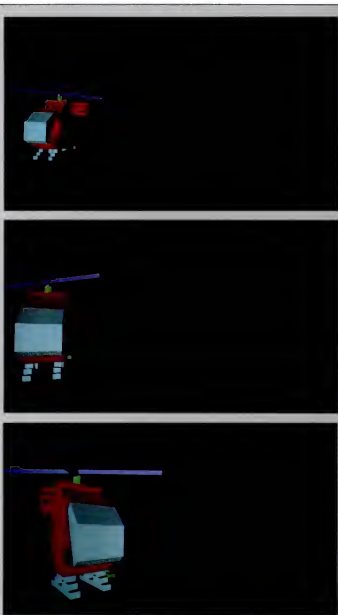


Figure 1: Three of the 32 images necessary to show a toy copter in flight.

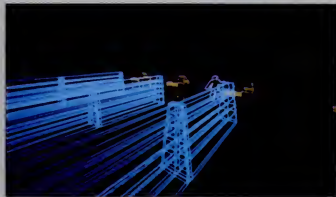
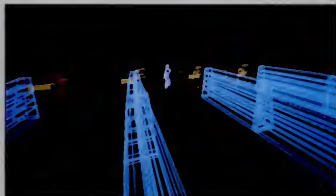


Figure 2: To render a one-quarter turn around the market, the PC created 513 images.

plify the task by giving a set of primitive commands that make the creation process easy to understand and learn. These commands allow you to "paint" as if you were working freehand, or they let you "draw" by creating a composite of simple objects with menu selections.

These software packages give you a new degree of animation freedom. Whether you're using BASIC or a sophisticated drawing system, you are able to string individual screens together to simulate movement. This type of animation has been coined "clunker" animation by the industry because of the "clunk" that a single slide makes as it is plopped into the slot of a projector. It reflects the one-by-one, "single-cell" nature of this type of animation. Clunker animation, which is the basis for most cartoons, becomes increasingly sophisticated as you add more color and elements and as the speed of "clunking" increases.

A "build" is another technique that is well suited to computer graphics because it successively adds images as overlays to the original image to give the effect of movement.

Clunker animation and builds both require you to draw, or render, each component of the image. This process drives

As a computer animator, the more images you generate, the more fluid the motion appears. But then you need more computing time, memory, and storage, and the overall costs soar.

animators to drink and companies to take shortcuts to save the expense of having an artist render endless sequences of animation. If you watch the Saturday morning cartoons, you'll see that too few images in an animation sequence produce stilted, jerky animation. PC-based graphics software reduces the amount of single-cell rendering necessary.

In addition to their drawing propensities, many packages have facilities to

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The Perfect series is a familial bundle of separate but related programs that gives you many of the advantages of an integrated package without making you pay for features you don't need.

All in the Family: The Perfect Components

First introduced in 1982 for 8-bit machines, the Perfect software series was never the ultimate software package for the PC, but it was serviceable. The programs in the package—*Perfect Writer*, *Speller*, *Filer*, and *Calc*—shared a similar command structure, and the price was right. Although the series was marketed through retail channels, the key to its success was bundling: It was given away with many of the most popular PC compatibles.

Perfect Writer's innovation, at the time, was to combine the text editor and formatter into a single package. The program was very powerful, but more difficult to use than programs such as *WordStar*. Compared to *Writer*, the original *Perfect Calc* and *Perfect Filer* were relative lightweights, while *Perfect Link*, introduced a year later, was as good as any other communications package.

Version 1.0 did not use screen menus, nor did its complex command system create a "what you see is what you get" word processing environment. Users required a "brain" memory as large as their PC's storage capacity just to memorize the complicated commands. Moreover, there were

no utilities designed to facilitate data sharing among Perfect's components. Finally, the series was rife with spurious help messages, and the keyboard would often "lock up" in response to incorrect entries. It was more suited to the small group of users who enjoy dealing with embedded format commands.

In May of 1984, Thorn/EMI, a British multinational, purchased the rights to the Perfect series from Perfect Software. Thorn's revisions have been extensive, and the company plans to market the new series as a standalone.

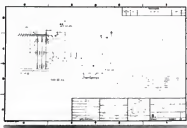
The new package, which also includes a Thesaurus program, seeks to remedy some of the cumbersome attributes of Version 1.0. It features pop-up menus and a more "integrated" family of software. The series is attractively priced, and upgrades to 1.0 are available. Despite Thorn/EMI's changes, however, *Calc* and *Filer* continue to be less powerful than *Perfect Writer*.

Perhaps the most prominent feature of the Perfect series is the way it handles "integration." Rather than offering an integrated package in the *Symphony* or *Framework* tradition, the Perfect series consists

of a familial bundle of related software programs that share a similar command structure and are capable of data transfer among the packages. In contrast to many integrated packages, each Perfect program

maintains its own integrity. A system of separate but related packages saves you from having to pay (literally or psychologically) for functions you aren't going to find it necessary to use.

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Reaching the Limits

However, despite the well-conceived design, there are limits to what the programs will do. Both *Perfect Writer* and *Perfect Calc* have serious problems handling large projects, and *Perfect Filer* is limited as a database program. Sharing data between programs requires a tedious amount of disk swapping, and extremely demanding users or hard disk users will prefer other packages.

Perfect software is a disk juggler's delight. It comes on nine disks that must be shuffled repeatedly. Of the nine, three contain samples and tutorials. If you write short documents and letters, you'll use 1,080K that you can maintain on four disks. Those with longer, manuscript-length chores will need a total of 1,280K worth of Perfect software spread over five disks.

Another difficulty arises with hard disks. The requirement that Perfect files (programs, overlays, documents, databases, and spreadsheets) must reside in one directory creates an organizational nightmare on a hard disk. Hard disks should be divided into smaller volumes using directories, but this feature is incompatible with Perfect's software. You can only edit files smaller than 250K, even on an AT with its capacious 20 megabyte disks.

None of the programs allows you to enter full DOS 2.x pathnames. Therefore, you are unable to save your documents anywhere but in the current directory. With DOS 3.x already in use, why buy a program that hasn't even been adapted to DOS 2.x?



Perfect Software

Thorn/EMI Computer Software, Inc.
3187 Airway Avenue, Bldg. C
Costa Mesa, CA 92626
(714) 751-3778

List Prices: *Perfect Writer* (includes *Spell-er*, *Thesaurus*, and *PSI*), *Perfect Filer*, and *Perfect Calc*, \$199 each; *Perfect Library Pack* (consists of *Writer*, *Calc*, and *Filer*), \$499; *Perfect Link*, \$129.

Requires: 128K RAM, two disk drives; supports mouse.

CIRCLE 686 ON READER SERVICE CARD

Adams of the screen display, you should invest in a camera hood. These cone-shaped devices place the monitor at one end and your camera at the other. The Kodak Instagraphics Slide Imager and Adapter and the DataCam camera are both dedicated cameras. With both models, the focal length and distance are built into the hood and the camera. You just hold the hood up to the screen and shoot. The DataCam model has diopters built-in to eliminate the parallax problem. Kodak has diopters for its Instamatic but not for the 35mm camera. The Kodak Instagraphics Hood comes with its own Kodak Instamatic and an adapter for your own 35mm camera. The DataCam comes with a dedicated 35mm camera.

The Next Step

The next step up the price/performance ladder is a film recorder. Optical film recorders, which start at about \$1,500, shoot a picture off a black-and-white monitor with three-color filter exposures. Such digital recorders as the high-resolution, pin-registered Matrix QCR transfer the image through digital magic. Don't forget that film recorders sometimes show slight misalignments from slide to slide because of registration problems. If the 35mm camera or slides are not pin registered, the resulting animation has an unpleasant jerkiness.

My experiments of shooting the computer screen with an 8mm camera resulted in grainy images; however, mysteriously, there was no evidence of scan lines. The graininess, when transferred to videotape, left an image that was too degraded to be useful.

For animations, or rough-cut commercials, I often use a video color camera to shoot the computer screen directly to a 1/2-inch videotape. I usually experience some focus and color loss, which causes a sort of moiré effect, but it's a perfectly suitable preview image to test theoretical animation moves quickly and at a relatively low cost.

You can obtain a very high-quality image by recording directly onto 1/4-inch videotape. Cubicomp's high-end version, Polycad/10V, has an NTSC signal, an external sync generator, and an external color encoder. This video camera enables

you to send images directly to the video recorder.

Rent or Buy?

If you don't want to invest in all this equipment or you want to try out some of these techniques before spending any money, you should rent time in an electronic studio, such as Coddbarrett Studios in Providence, Rhode Island. After 8 hours of experimenting with Coddbarrett's sophisticated equipment and a handful of Cubicomp disks, I produced a 1/4-inch animated videotape.

If you're not ready to become the Ansel Adams of the screen display, you should invest in a camera hood.

Although I was generally pleased with the results at the studio, I learned some important things about transferring frames from a microcomputer to a videotape. Some of my computer screens were too full to produce the desired effect on the videotape. As my image journeyed from my 512 x 512 computer monitor to the Coddbarrett computer, out to the 525-line monitor, the Sony deck, the deck monitor, and the 1/4-inch tape, I suffered minor losses: off-center images as well as lost tops and bottoms.

What is the final solution? It takes a mixed bag of tricks. Depending on the effect you ultimately desire, the cost, and the availability of facilities, you will inevitably find yourself mixing and matching myriad electronic techniques as I did. Fortunately, rental services allow you to dabble at minimum expense until you have a better idea of what you need.

Today's computer graphic animators are encountering the same hurdles as the data and text folks who came down the pike before them. While pictures may be worth a thousand words, they are also considerably harder to get in and out of the machine. But without a doubt, the PC has become an important element in the graphic animator's paintbox.

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Significant Improvements

Many users who found Version 1.0's Escape Code/Control Code command system awkward and hard to learn will appreciate the new pop-up menus. These are

quick enough to stay out of the way, yet informative enough to guide the novice through murky waters. Menu choices can be made with a mouse, although we didn't explore this option.

The new Perfect programs have a fine on-screen help system. At almost any point in 2.0's command sequence, you can type a question mark to call up a page of help, and the help screens that appear are clear and well written.

The function keys have 20 designated "shortcut" functions assigned for each of the four Perfect packages. There was no help screen available to explain the operation of the programmed function keys, but each package comes with a plastic overlay corresponding to its built-in functions. To exchange data, you must swap not only disks, but plastic overlays too. Once the overlays are gone, the only available assistance is a page that's buried somewhere in the documentation.


User Education

Each of the Perfects comes with lessons and samples on a separate disk, so you can learn about the package by actually using it. What makes this approach less fool-proof than the traditional CAI approach is that it is possible to alter the lesson unintentionally. For example, if you fire up the *Perfect Calc* lessons and then accidentally enter the Datasheet Delete command, your lesson is gone.

The lessons are most useful for intermediate users. They are too fragile for novices and too cumbersome for experienced users. Perfect's lessons are a step in the right direction, but they are too small a step.

The manuals, however, are excellent. Well-organized and well-indexed, they explain how to use every function in the package and supply numerous examples. An introductory section for the novice helps new users master the program rapidly. The writing style is excellent, and graphics are used extensively to supplement the text. Howard Wade, the principal author of the manuals, has done an admirable job.

The Perfect manufacturers avoid the traditional PC-style mini-looseleaf binders. Instead, the documentation for each program comprises a formidable 300-page paperback. Although the paperbacks are professionally produced, you may prefer binders because you can leave them open to a given page without resorting to coffee mug paperweights.



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Another disadvantage of the @ command system is its relative inflexibility. An @style directive can be given *only* at the beginning of a document to control line spacing, paragraph style, and so on. Allowing placement of @style directives throughout a document would make styling much easier.

A few other annoyances are minor enough to live with. For instance, when you insert text in mid-paragraph, the paragraph borders lose their alignment. You can enter a command to realign a paragraph, but there is no command that allows you to reformat the entire document.

Worse, perhaps, is that *Perfect Writer* doesn't automatically create a backup file. It would be nice if this were a configuration option. Novices are prone to mistakes—and there are countless people who are grateful for the protection of automati-

cally created backup files. Another inconvenience is that *Perfect Writer* 2.0 doesn't tell you where you are in your document. In Version 1.0, there was a "Where Am

The new *Perfect Writer* is both a simple "What you see is what you get" word processor and a sophisticated embedded format document processor. However, you can't use both at once.

I" command that displayed the current location. The tidy display screen of 2.0 sports no status messages whatsoever; where you are is something only your system knows for sure.

Moreover, the PgUp and PgDn commands have mismatched activity. A PgUp followed by a PgDn doesn't always return you to where you started from. So, if you want to see something about 20 lines back, and you hit PgUp to take a look, the ensuing PgDn may leave you stranded on a new line.

A final gripe concerns the Home and End keys, which move from the current location to the beginning or end of the document. The Home key is next to the Backspace key, and it's easy to hit it while backspacing over mistakes. Zipping all the way to the front of a long document is an extreme consequence for poor keyboard fingering.

Perfect Writer is undoubtedly a powerful word processing system. With a library of over 30 predefined format options to pick and choose from, you can create attractively structured documents. Moreover, *Perfect Writer* can be configured for

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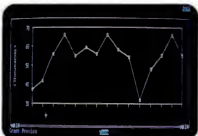
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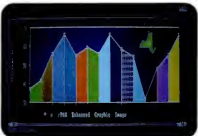
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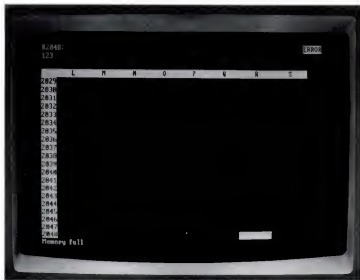


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Dumb.



Memory full.

*Lotus 1-2-3™ allocates memory to empty cells,
robbing users of valuable capacity.*

Lotus 1-2-3 claims a spreadsheet capacity of 256 columns by 2048 rows. Unfortunately, its actual capacity often turns out to be much less, because memory is wasted on empty cells.

That's the case in the screen on the left,* where all unused cells between column R(18) and row 2048

are needlessly allocated while trying to enter only one number, filling memory completely.

The Smart Spreadsheet, on the other hand, has a unique space-saving feature called "sparse matrix," which prevents such a calamity from occurring.

That's because Smart

allocates space for only those cells which are filled, not those that are empty.

And Smart's "virtual memory" design takes its capacity one step further. It means that the size of a spreadsheet is not limited by a computer's RAM (as it is with Lotus 1-2-3), but by disk space alone. It's like having

thousands of additional cells of memory on reserve.

These features, coupled with Smart's enormous capacity for 999 columns by 9,999 rows, make it the largest spreadsheet available.

But The Smart Spreadsheet's unequalled power and capacity are only part

*The screens shown above are actual representations of Lotus 1-2-3 and The Smart Spreadsheet as they appear when used on a standard IBM PC with 256K RAM.

Stalking The Elusive Subdirectory Path

DOS 2.0 doesn't allow older programs to access files in any directory other than the current one. These five programs offer a solution: a PATH-like facility for data files.

When IBM and Microsoft designed the DOS subdirectory scheme (introduced with DOS 2.0 more than 2 years ago) for managing files stored on hard disks, they thought it was so spiffy that every PC software developer would immediately rewrite its programs to take advantage of the new feature.

Not only did every software developer not join the subdirectory parade, but IBM and Microsoft didn't even update all of their products to work with the new system.

The real sin, however, was that IBM and Microsoft didn't provide anything in DOS that would enable older programs to access files in any directory other than the current one. They did, of course, provide the DOS PATH command that allows programs, including .EXE, .COM, and .BAT files, to be used regardless of what directory they are stored in, but nothing like it has ever been released for data files. As a result, 2 years later, many users don't take full advantage of the otherwise useful subdirectory

system for organizing their files on hard disks.

Several software companies now offer utility programs that provide a PATH-like facility for data and overlay files. These programs enhance DOS's own file functions to let them find files in other subdirectories and virtual disks on your hard disk. They, in effect, create their own paths for DOS to follow. Although most of the companies that market these products are small, independent software shops, one purveyor in this field, oddly enough, is IBM itself.

Five such products are reviewed here: *File-Path* Versions 2.0 and 3.0, from SDA Associates in San Diego, California; *File Facility*, from IBM in Boca Raton, Florida; *DPATH*, from Personal Business Solutions in Frederick, Maryland; and *EasyPath*, from Polygon Software in New York (see the comparison chart in Figure 1). Most are inexpensive—ranging from \$19.95 to \$34.95—except for *EasyPath* which, at \$100, isn't as easy on your wallet as it is on your data files. (See sidebar, "The Mechanics of DOS-Enhancing Software" for an explanation of the enhanced DOS functions and extra features of these programs.)

a wide variety of printers. The documentation gives simple instructions for configuring the program to any printer that isn't mentioned. *Perfect Writer* also makes use of specialized printer features such as proportional spacing.

Problems with Length

In the manual's introduction, the *Perfect Writer* folks claim that their "advanced software engineering design" lets *Perfect Writer* handle very large documents easily and comfortably. Similarly, in Appendix D, they say that *Perfect Writer* can handle 100-page documents without adding extra memory to the computer. Both these claims are hokum. As long as you work with short documents (ten pages or less), *Perfect Writer* will meet your needs. However, it fails at handling longer documents.

For example, the text of this article originally fit into a single file. Eventually the file grew to about 32K characters. Without any warning whatsoever, the message "Swap File Full" appeared. That put us into a real pickle—once *Perfect Writer* runs out of memory, it is crippled. We were able to salvage the situation by reconfiguring *Perfect Writer* for a larger document, but this meant that we had to purge the *Perfect Speller* from the *Perfect Writer* program disk. We were then able to split the document in half and continue with our work.

A word processor for professional use should be able to handle documents as large as a single floppy disk (360K). At the very least, it should be able to handle documents that fit into memory. It's ironic that *Perfect Writer* has gone to great lengths to swap part of the document out to disk in order to circumvent memory limitations, when today's memory-rich PCs often have more space in memory than on disk.

How big a file can *Perfect Writer* handle? It is possible to reconfigure the size of the swap file, but for any given editing session its size is fixed. We made a disk containing the *Perfect Writer* program and the largest possible swap file—248K. Then we tried to edit a 243K document. After an unconscionable 8 minutes and 10 seconds of continuous disk grinding, *Perfect Writer* finished its startup process and allowed us to start editing.

Perfect Writer should warn you when free space is running low, instead of when it is out, and include a query command that tells you how much space is available. Finally, let *Perfect Writer* use all the memory on a PC.

Perfect Speller

Perfect Speller (PS) works well—it was able to flag 70 potentially misspelled words in a 5,000-word document in 2 minutes and 52 seconds. After it scans the file,

Perfect Thesaurus
allows you to look up
the synonyms for a given
word in its 50,000 word
lexicon. We tried it
on many words, and it
usually supplied several
appropriate synonyms.

PS displays a list of the potentially misspelled words. As you work your way through the list, you can instruct PS to ignore a word, add it to the dictionary, or mark it in the text. Then, when *Perfect Writer* is started, it works through the misspelled words in context.

When you add words to the dictionary supplied with *Perfect Speller*, you increase the chance that the program will miss an incorrect word. Therefore, rather than adding a few hundred words to the *Speller* dictionary, it is better to create your own dictionaries for specialized topics. However, PS searches only one dictionary each time it is invoked. It would be preferable if it could use the main dictionary in conjunction with a customized dictionary. Dual dictionaries make it easier to tell a spelling checker about technical terms without adulterating the main dictionary.

Perfect Writer's literature boasts that the *Speller* uses a 50,000-word dictionary. Perhaps they have invented sub-bit storage methods. Their dictionary file is 22,000 bytes long. That works out to about 4 bits for each word. Even with the best compression techniques, a 50,000-word dictionary should require over 100,000 bytes of storage.

Perfect Thesaurus

An interesting extra in the *Writer* package is *Perfect Thesaurus*. It allows you to look up the synonyms for a given word in its 50,000-word lexicon. We tried it on many different words, and it usually supplied several appropriate synonyms. For example, it suggested *nonsensical*, *absurd*, *laughable*, *ludicrous*, *comic*, and *preposterous* when we inquired about *ridiculous*. Although *Perfect Thesaurus* supplied 16 synonyms for *perfect*, it failed to find any synonyms for *altruistic*, *inchoate*, *ferment*, *madam*, or *hover*. Typical search times were 5 to 15 seconds—much faster than using the more familiar paperbound thesaurus.

Perfect Thesaurus must be invoked from a *Writer* menu; an on-screen message then advises you to insert the *Thesaurus* disk. However, *Perfect Writer* never reminds you to remove the *Thesaurus* disk. If you try to write your document before you remove the *Thesaurus*, your disks are likely to become corrupted. You can also corrupt your disks by placing the *Thesaurus* in the wrong drive.

PSI Program Master

The final extra that comes with *Perfect Writer* is a master menu program called *PSI*. *PSI* lets you run any of the software in the *Perfect* series without entering DOS commands. In addition, it has a disk utilities facility that lets you view, delete, rename, copy, or compare files. *PSI* assumes that you own the entire *Perfect* series. Since it is unavailable to people who have only *Perfect Link*, *Filer*, or *Calc*, you'll need to do your disk management by returning to DOS.

Perfect Filer

Perfect Filer is an easy-to-use, index card type of records manager. Although it has reasonably sophisticated search-and-sort criteria, *Filer* is not a relational database manager: Each *Filer* database must stand on its own—you can't put address information in one and sales information in another if you need both kinds of information in one report. In many respects, *Perfect Filer* is the most "dependent" relative in the *Perfect* family. Having *Perfect Filer* without *Perfect Writer* or *Perfect Calc* is the software equivalent of being all

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(*) Benchmark run on an IBM PC using MS Pascal version 3.2 and the DOS linker version 2.6. The 179 line program uses the "Gauss-Seidel" program out of Alan R. Miller's book, "Pascal programs for scientists and engineers" (Seymour, page 128) with a 3 dimensional non-singular matrix and a relaxation coefficient of 1.0.

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The Mechanics of DOS-Enhancing Software

Here are the features to look for in DOS-enhancing utility programs beyond the minimum capability of opening a file.

The five data-path programs reviewed in the main article share some important functions, which deserve further explanation. These functions fall into two main categories, those that assist DOS to find your files in other disks and subdirectories and those that make the product easier to use. In the main article's Figure 1, and in this sidebar, I've called these categories Enhanced DOS Functions and Extra Features.

Enhanced DOS Functions

The data-path products allow these DOS functions to find data files and program overlays outside the current directory.

Open a file. Opening a file to read its data in a directory (or directories) other than the current subdirectory is a minimum requirement for all five products tested. They all have this ability.

Create a file. The ability to save a file that was opened and modified in a specified subdirectory is available in some of the products. It's usually an option, and I don't recommend using it. If you use a file from another subdirectory and modify it, you should save it in the current directory. You can always move it back later if you want to.

Search for a file. Some applications, such as *MultiMate* and *IBM Professional Editor*, will not open a file unless it can be found using the DOS search function call, which works as if the program were executing an internal DIR command. This ability may be important for your applications, but it is not used by most.

Delete a file. If you issue a DEL or ERASE command (or your application program does it for you), the program will find the file in a directory previously specified in the data path and erase it. Be-

cause this ability can be dangerous, you may wish to avoid programs that know how to do it or at least avoid using the feature.

Rename a file. If you rename a file that's in a specified directory in the current data path, it will be renamed in its own directory, not the current one. You'll have to try this ability out in your own environment to see what it does to you, but it can be dangerous (that is, it can cause program to crash) if your application automatically renames a file to backup file, modifies it, and then deletes the backup when the work is done.

Extra Features

These features make the data-path programs easier to use.

Data-path override. This feature allows you to override the current data path by specifying your own path in a command or internally from within an applications program. This function can be more important than it seems at first because you may have specific needs that are not addressed in the current data path.

Use of current DOS path. Using the current DOS path means you don't usually have to do anything but install the product. Whenever you specify a path for DOS, the product will follow and allow the DOS PATH command specification to become the current data path.

Use of DOS PATH syntax. This feature allows you to learn one (somewhat complicated) command syntax once. The product does not have to use the current DOS path to have this feature. It can use the same syntax in its own command. The PATH command syntax is

C>PATH DIR1; DIR2; DIR3

The DIR1, DIR2, and DIR3 parameters

represent the subdirectories to be searched; the order of the search is specified by their order in the PATH command. You separate the subdirectories by semicolons and disable the PATH command by requesting a null path

C> PATH:

Extended directory syntax. A product can extend the specification by allowing DOS wild cards (* and ?) in data-path directory names and by requesting all subdirectories in a directory to be searched. This feature can be useful because the total length (in characters) of the path specification is usually limited.

Edit current data path. Editing, as opposed to respecifying, the current data path may be handy when you need to temporarily add or insert a subdirectory to it and then delete it without changing the basic path. Consider this an advanced feature because it's probably just as easy to respecify the whole data path (as you already have to do with the DOS PATH command).

On/off switches. With this handy feature, you can switch the data path, and possibly some of its features, off, then switch it back on without modifying it.

Save/restore data path. Many programs let you save a path specification in a file for later use. You can achieve the same result by using these programs in batch files, but some products offer additional tools for you to use.

Execution path option. Some programs allow you to execute other programs without first exiting to DOS. Generally, these programs cannot make use of the DOS path to find these .EXE, .COM, or .BAT programs. Several data-path products allow these programs to use their own paths to find other programs.—J.D.

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Data Storage

Next, we tried an experiment to see how much data could actually be stored in a *Perfect Calc* worksheet. Our first test case was a spreadsheet that contained only text. We put a ten-character label into a cell and then replicated that cell into 100 locations. Next we experimented to see how many copies we could make. We found that *Perfect Calc* stores approximately 25K of text (dispersed in 2,500 cells) in a spreadsheet.

Perhaps a more revealing test is number storage. We followed essentially the same

Saving a *Perfect Calc*
spreadsheet was
relatively fast—only
about 15 seconds. But
reading that same
spreadsheet took an
astounding 16 minutes
and 10 seconds.

procedure as before and stored a number in each cell. The program ran out of memory with 3,000 cells full. We then tried *Perfect Calc*'s "large memory" version for systems with more than 128K of memory. When we repeated the experiment with storing numbers in the worksheet, the improvement was a scant 25 percent. This may be an adequate storage capacity for many users, but it indicates poor use of a PC's memory. Based on our machine's 256K memory and the size of DOS and *Calc*, we expected to store at least 10,000 numbers. *Perfect Calc* ought to be able to deduce for itself how much memory is

available and then use what's there.

Perfect Calc's greatest limitation may be its I/O capability. Most spreadsheets allow us to use DIF format files. DIF files are designed to allow data interchange from one spreadsheet program to another or from a spreadsheet to a graphics program. Since *Perfect Calc* has no DIF input or output, your spreadsheet is saved in text format rather than DIF format. This is essentially why *Perfect Calc* can be used with the *Writer* and *Filer* components: You can use *Writes* within the spreadsheet to modify its format and *Files* to ship things over to *Perfect Calc*.

Looking at these intermediate text files is helpful because it gives you an opportunity to check your format along the way, but it's also precisely what slows *Perfect Calc* down. Though text files let *Calc* talk to *Filer* and *Writer*, DIF files are faster and more compact.

Perfect Link

Perfect Link (PL), a flexible and easy-to-use communications program, provides a gentle introduction to the not-so-gentle art of telecommunications. With *PL* (plus a modem and an account) you can log onto the Dow Jones News/Retrieval service to check stock quotes, access CompuServe to join in a multiplayer strategy game, or do nearly anything else that telecommunications has to offer.

PL comes factory-configured with ten information utilities: the Dow Jones News/Retrieval Service, CompuServe, CompuStore, NewsNet, Knowledge Index, Official Airline Guide Electronic Edition, The Source, Western Union Easylink, MCI Mail, and the Perfect Software Bulletin Board. But even if you want to access some other system, *PL* is easy to use because of its simple menus and configurability.

About one-fourth of the *Perfect Link* manual is a tutorial description of six common information utilities. The manual promised disk-based descriptions for three other utilities, but they were absent from our copy of the software.

While the most interesting aspect of *PL* is its built-in support for ten popular information utilities, the problem with built-in support for utilities is that the world changes: Access numbers and log-on se-

quences may change, a utility may go out of business or one that is unknown today may be popular tomorrow. Changes like these may make a telecommunications program that features such support outdated in a year or two.

Link has the Modem7 file transfer protocol and can copy incoming data into a disk file or a printer. *PL* also has a complete set of disk utility routines that allow

The most interesting
aspect of *Perfect Link* is
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of business.

you to rename or delete files and perform other functions without leaving the program. The function keys also can be programmed to send short messages—a useful feature for sending configuration sequences to smart modems or frequently used commands to the host computer. *PL* can be configured for most popular modems, including those from Hayes, U.S. Robotics, and Novation.

Most of the *PL* manual is written for the telecommunications novice. Telecommunications jargon is clearly explained, and the discussions are very tutorial. A big problem with the manual is that Appendix A, entitled "Installing *Perfect Link*," never mentions installation. It should have been entitled "A Ten-Page Telecommunications Primer," and the *PL* folks should have added a section that discusses installation.

Although not revolutionary, *Perfect* software has "the right stuff": It's a uniform and comprehensive package whose familiar components combine ease of use with an impressive range of performance. While it may not be the right choice for experts, many novice and intermediate users who need a wide range of functions, but can do without the high performance of a fully integrated package, may find it the perfect answer. ■



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SUBDIRECTORIES

FilePath 2.0 will fill most of your needs, unless you require the create-file feature or use a product that offers file search. Moreover, its syntax sets it apart from the other products. You can specify data paths by using wild-card characters in the directory names. They allow a path to include parameters such as

C:*.WP

which would place all directories with a .WP filename extension on the data path. You can use question marks (?) in a similar fashion and also put them in the filename portion of the directory name. If that's not enough, *FilePath* offers the /T option, which specifies that all subdirectories con-

SDA has established a strong niche in the end-user market with *FilePath* Version 2.0 and is aiming at the systems development market with 3.0.

tained in a specified directory be included in the data path. That option can be quite powerful, such as in the command

C:\T

which puts all subdirectories on the disk into the data path.

For \$10 more, Version 3.0 adds a file-search ability, a full-screen or command-level data-path editor that allows you to modify the current path, and a save/restore facility. In addition, you can switch every *FilePath* option on and off in Version 3.0. This version is still undergoing beta testing (it arrived just in time for this review), and more features may be added by the time SDA releases the final product.

SDA has established a strong niche in the end-user market with Version 2.0 and is aiming at the systems development market with 3.0. The company's pair of *FilePath* products will find themselves in stiff competition for end-users from IBM and even stiffer competition for systems developers from Polygon Software. However, their wild-card abilities alone may make them attractive to you. ■

Finding Anything Anywhere

Locating snatches of old files on crowded disks could require the skills of an archeologist, unless you let this program do the spadework for you.

If you're fortunate enough to have a hard disk, you've probably noticed that whole files often seem to burrow into that 10-megabyte abyss and vanish without a trace. Keeping track of just what went where is always a problem with a seasoned disk, and the famous archeologist, Dr. Rosetta Stone, compounded it by her penchant for honeycombing her disk with subdirectories. She began to translate an ancient scroll some months ago but forgot in which file she put her work. She only recalls that the passage involved the biblical name Ishmael.

Fortunately, Dr. Stone has a copy of this column's program, called LOCATE. LOCATE is designed to find little snatches of files, like "Ishmael," and can search an entire disk (hard or floppy) for them. Thus, when she typed:

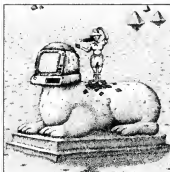
LOCATE Ishmael

the program returned the happy message:

```
FOUND IN
\DEEP\DEEPER\DEEPEST\
ARCHIVES.FIL:
Call me Ishmael.
```

Apparently, she had buried her work three levels down, in the subdirectory \DEEP\DEEPER\DEEPEST, in a file named ARCHIVES.FIL. [Apparently, too, Dr. Stone had been reading Moby Dick before translating Genesis 16:11—Ed.] To let Rosetta know the context, LOCATE types out a few words (forty characters in all, when available) on either side of the match, with the phrase being sought in the middle.

1985/No. 10



LOCATE.COM

LOCATE is available to anyone with some patience (and DOS 2.0 or higher). All you have to do is set aside enough time to type in the BASIC program listed in Figure 1 and run it. Entering all those numbers is admittedly no breeze, but it's well worth it for hard disk owners: 10 megabytes is a vast territory to have to search without help. The BASIC program takes all the numbers you see in the data statements and transmutates them, one by one, into LOCATE.COM. The data statements actually are LOCATE.COM itself, byte by byte, so every number must be typed in accurately. The original program is in assembly language, and for those with an interest or a little assembler skill under the belt, that listing is contained in Figure 2. [Note: if you have a modem, you can download these files directly from PC Magazine

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PROGRAMMING

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More Than a FIND

Superficially, LOCATE is somewhat like the PC-DOS utility FIND, except that the FIND filter will only search through explicitly named individual files. Other, commercial programs are available that will search for strings in a similar way, but

they can only scour one subdirectory at a time, and each time you use them you must retype the name of the subdirectory you want to search.

LOCATE operates more efficiently than either of these alternatives and even strips the high-order bits so you can use it with such programs as *WordStar*. It automatically searches through your entire current directory, scrutinizing each file in

turn. It then checks the root directory (usually *CA* for hard disks, *AA* for floppies) for a file named *PATH.DAT*. If such a file is not there, LOCATE simply exits. If you have provided a *PATH.DAT* file, however, LOCATE will open it up and read in additional paths you want it to search. You can even include entirely different disk drives in *PATH.DAT*, and LOCATE will search them too.

```

10 OPEN "LOCATE.COM" AS #1 LEN = 1 'Open LOCATE.COM
20 PRINT "CREATING LOCATE.COM"
30 FIELD #1,1 AS BYTE.$ 'Specify what goes into it
40 FOR N = 1 TO 517 '517 bytes
50 READ BYTE.$
60 LSET BYTE.$ = CHR$(BYTE.$) 'Load byte into buffer
70 PUT #1 'Write buffer out
80 NEXT N
90 CLOSE #1 'Close file
100 PRINT "LOCATE.COM CREATED." 'And you're done.
110 END

1010 DATA 235, 54, 144, 40, 67, 41, 49, 57, 56, 53
1020 DATA 32, 83, 46, 72, 111, 108, 122, 110, 101, 114
1030 DATA 13, 10, 13, 10, 70, 79, 85, 78, 68, 32
1040 DATA 73, 78, 32, 36, 1, 0, 0, 0, 0, 0
1050 DATA 0, 0, 0, 0, 0, 0, 92, 80, 65, 84
1060 DATA 72, 46, 68, 65, 84, 0, 186, 176, 0, 180
1070 DATA 26, 205, 33, 191, 92, 0, 232, 179, 0, 186
1080 DATA 92, 0, 180, 78, 205, 33, 187, 202, 0, 139
1090 DATA 23, 137, 22, 34, 1, 129, 250, 0, 240, 114
1100 DATA 3, 233, 142, 0, 131, 250, 0, 119, 3, 233
1110 DATA 134, 0, 232, 99, 1, 139, 14, 38, 1, 191
1120 DATA 49, 4, 187, 130, 0, 138, 7, 242, 174, 227
1130 DATA 115, 187, 128, 0, 51, 210, 138, 23, 74, 190
1140 DATA 131, 0, 74, 166, 116, 252, 79, 131, 250, 0
1150 DATA 119, 226, 141, 22, 20, 1, 180, 9, 205, 33
1160 DATA 180, 2, 187, 219, 0, 128, 62, 40, 1, 1
1170 DATA 116, 3, 187, 206, 0, 138, 23, 128, 250, 0
1180 DATA 116, 5, 205, 33, 67, 235, 244, 87, 83, 81
1190 DATA 185, 40, 0, 180, 2, 178, 58, 205, 33, 178
1200 DATA 13, 205, 33, 178, 10, 205, 33, 131, 239, 20
1210 DATA 187, 49, 4, 59, 251, 119, 2, 139, 251, 3
1220 DATA 30, 34, 1, 138, 21, 71, 59, 251, 119, 11
1230 DATA 128, 250, 30, 119, 2, 178, 32, 205, 33, 226
1240 DATA 238, 89, 91, 95, 235, 132, 232, 37, 0, 60
1250 DATA 18, 116, 3, 233, 86, 255, 205, 32, 190, 5
1260 DATA 42, 198, 69, 1, 46, 198, 69, 2, 42, 198
1270 DATA 69, 3, 0, 195, 131, 249, 0, 116, 6, 128
1280 DATA 39, 127, 67, 226, 250, 195, 180, 79, 205, 33
1290 DATA 60, 18, 116, 3, 233, 147, 0, 128, 62, 40
1300 DATA 1, 1, 116, 58, 254, 6, 40, 1, 184, 0
1310 DATA 61, 141, 22, 46, 1, 205, 33, 115, 5, 176
1320 DATA 18, 233, 145, 0, 185, 44, 1, 139, 216, 180
1330 DATA 63, 141, 22, 5, 3, 205, 33, 5, 5, 3
1340 DATA 163, 36, 1, 180, 62, 205, 33, 199, 6, 43
1350 DATA 1, 5, 3, 185, 44, 1, 187, 5, 3, 232

```

(Figure 1 continues)

Figure 1: The BASIC program to create LOCATE.COM.

PROGRAMMING

(continued)

```

1360 DATA 168, 255, 139, 54, 43, 1, 191, 92, 0, 187
1370 DATA 219, 0, 198, 6, 45, 1, 0, 59, 54, 36
1380 DATA 1, 125, 192, 128, 60, 30, 114, 13, 198, 6
1390 DATA 45, 1, 1, 138, 4, 136, 7, 67, 164, 235
1400 DATA 232, 128, 62, 45, 1, 1, 116, 3, 70, 235
1410 DATA 222, 137, 54, 43, 1, 198, 5, 92, 198, 7
1420 DATA 92, 67, 137, 30, 41, 1, 71, 232, 84, 255
1430 DATA 186, 92, 0, 180, 78, 185, 0, 205, 33
1440 DATA 60, 18, 116, 174, 128, 62, 40, 1, 1, 117
1450 DATA 18, 139, 30, 41, 1, 198, 205, 0, 70, 138
1460 DATA 36, 136, 39, 67, 128, 60, 0, 117, 245, 195
1470 DATA 80, 83, 81, 82, 186, 219, 0, 128, 62, 40
1480 DATA 1, 1, 116, 3, 186, 206, 0, 184, 0, 61
1490 DATA 205, 33, 139, 216, 186, 49, 4, 139, 14, 34
1500 DATA 1, 180, 63, 205, 33, 163, 38, 1, 180, 62
1510 DATA 205, 33, 187, 49, 4, 139, 14, 34, 1, 232
1520 DATA 8, 255, 90, 89, 91, 88, 195

```

(Figure 1 ends)

```

CODE_SEG SEGMENT
ASSUME CS:CODE_SEG,DS:CODE_SEG,ES:CODE_SEG
ORG 100H
ENTRY: JMP LOCATE ;Start off right for a .COM file
;Skip over Data area

COPY_RIGHT DB '(C)1985 S.Holzner' ;Author's Mark
FOUND_MSG DB 13,10,13,10,'FOUND IN $' ;Like it says
LEN DW 1 ;The file length (low word)
PATH_LEN DW 0 ;Length of Path.Dat
NUMBER DW 0 ;Number of bytes read from file
EXTRA_PATHS DB 0 ;=1 if we open & use Path.Dat
OLD_BX DW 0 ;Save pointer to path at CS:DBH
OLD_SI DW 0 ;Save SI as pointer also
START_FLAG DB 0 ;For searches in Path.Dat
PATH_DAT DB "\PATH.DAT",0 ;ASCII string of Path.Dat

LOCATE PROC NEAR ;Here we go

MOV DX,0B0H ;Move Disk Transfer Area to CS:0B0H
MOV AH,1AH ;Matched file information goes there
INT 21H

MOV DI,5CH ;Use CS:5CH to put '*.*' at for search
CALL PUT ; in current directory
MOV DX,5CH ;Point to '*.*' for search
MOV AH,4EH ; and find first matching file
INT 21H ;Match now at DTA, 0B0H

LOOP: ;Loop over matches now
MOV BX,0CAH ;Get file length, came from match
MOV DX,[BX]
MOV LEN,DX ;Store in Len
CMP DX,60*1024 ;Don't write over stack, allow < 64K files
JB NOT_BIG ;Range extender (Find > 127 bytes ahead)
JMP FIND
NOT_BIG: CMP DX,0 ;Was this a 0 length file (disk dir or label)?
JA FILE_OK ;No, go on and read it

```

(Figure 2 continues)

Figure 2: Assembly language listing (.ASM) for LOCATE.COM.

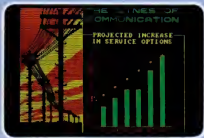
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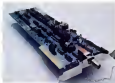
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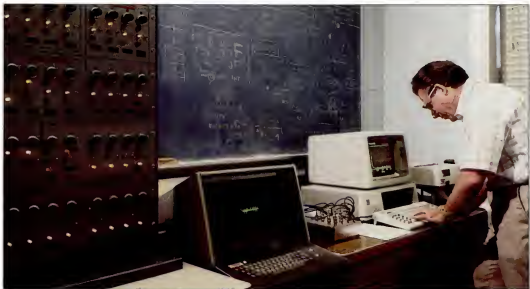


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S·I·M·U·L·A·T·I·N·G NUCLEAR ACCIDENTS

At the Brookhaven National Laboratory, a PC working in tandem with a computer used for simulation helps scientists study ways in which nuclear power plant accidents can be avoided.

The Brookhaven National Laboratory's high-flux beam nuclear reactor towers above the trees of its bucolic Long Island setting, visible for miles around. But the reactor is not the Brookhaven Department of Nuclear Energy's only sophisticated research tool; it also has some familiar IBM PCs. They hold their own with computers specialized for simulation, and sometimes, they even run the show.

Here, Dr. Wolfgang Wulff and his group of scientists use several computers as well as customized software to simulate potential nuclear power plant accidents. *Flight Simulator* is probably the most

familiar simulation software to PC users; it enables you to fly under bridges and make crash landings without even messing up your hair. As with the pilot-training *Flight Simulator*, nuclear reactor behavior simulation has real life-protecting value, since its ultimate use is to prevent a nuclear power plant accident. It can help designers alter plant architecture and procedures to

provide data needed during a crisis.

Of course, most procedures at a nuclear power plant are automated. Dr. Wulff explains that in the event of an accident, many automated steps occur in rapid succession: "Pumps are shut off, valves are closed, and emergency coolant is injected." In such a situation, the plant's computer system also eliminates a lot of impossible things. That is, it gives you only two or three possibilities for what has occurred and what course to follow. The operator can then call up the emergency procedures for these situations on the screen.

"At the Three-Mile Island nuclear plant

NUCLEAR SIMULATION

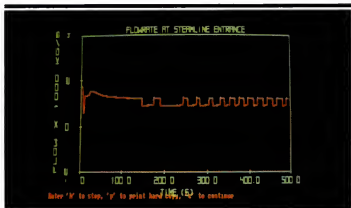
[near Middletown, Pa.],” Dr. Wulff continues, referring to the accident that occurred there on March 28, 1979, “a lot of these things were automatic, but then 6 hours later there were still the high pressures and high temperatures. It was a condition that we hadn’t seen before, and we didn’t have procedures on how to recover. When you are in a situation that no one has thought of before—one not written up in the procedures—that’s when you need a computer simulation.” The status of the plant at the critical moment can be input into the simulation program and the effects of alternative actions simulated.

Dr. Wulff would like to see nuclear power plants install simulation programs to run in parallel with plant operations. If a plant’s real-life computerized distress-analysis display system indicated that a valve had stuck or a thermal coupler had melted, these signals could be compared with the simulation program’s results; discrepancies would aid in diagnosing the problem.

Fortunately, a plant would not have to be in such dire straits before a simulation program would be useful. By running simulations of a plant as it is currently designed and administered, plant managers can consider possible preventive measures. “Based on the results,” explains Dr. Wulff, “a plant may do what is called backfitting, but that costs a lot of money. Many times plants make administrative changes or change the control system to create another safety trip.” Like the simulators used in training pilots, a nuclear reactor simulator is an invaluable training tool for plant staff.

Calculation programs, rather than full-fledged simulation programs, have been available for some time, but using these, it could take several months or a year to arrive at an answer to a problem. According to Dr. Wulff, it took groups of researchers 3 months to compute how to fix the reactor after the accident at Three Mile Island. Such intensive effort, which requires long number-crunching programs, is very expensive. Dr. Wulff says that after TMI, researchers began exploring different approaches.

The Brookhaven group began looking for smaller, special-purpose computers and decided on the AD 10, built by



Each line of the graph represents one output of the nuclear reactor simulation.

Applied Dynamics International, Inc., of Ann Arbor, Michigan. Dr. Wulff says the AD 10 can't be used for much else besides simulation. But at \$250,000 per machine, Brookhaven's two AD 10s cost a tenth of what a big computer costs, which puts them in a range a utility can afford and allows much faster computing. The AD 10 runs 3 to 5 times faster than real time, depending on the problem being solved, and is 10 to 30 times faster than the CDC machines that the Brookhaven group previously used, according to Dr. Wulff.

On obtaining the AD 10s—which, together with their operating software, MPS 10, are often referred to as System 10s—the Brookhaven team wrote a customized simulation program called High Speed Interactive Plant Analyzer, or HIPA. HIPA simulates a boiling water reactor. When attempting to simulate a nuclear reactor, some laboratories examine its thermal stresses or the nuclear physics (neutronics). Brookhaven has chosen to concentrate on the hydraulics, which is concerned with the behavior of the coolant and the resulting temperatures, so it uses a simplified model for the neutronics part.

Even with this simplifying set of assumptions, a simulation program is extraordinarily complex. As Dr. Wulff explains, “We are dynamically solving the conservation laws of mass, momentum, and energy. We are integrating some 250 differential equations, and we are computing 4,000 parameters.” HIPA de-

mands the combined computing power of two AD 10s, a PDP-11 mini-computer—and an IBM PC-XT.

The PC Gets Involved

The PC actually serves as a master terminal to this whole system. From the PC, which is in an office, the researcher communicates with the PDP in the computer room over a 1200-baud phone line, telling it to start each of the two AD 10s located a few feet away. Before the PC was brought in, two terminals at the PDP had to be used, one for each AD 10. The PDP, in turn, loads the two AD 10s' combined million words of memory with HIPA and with large tables of precomputed constants. With one interpolation of the table, an AD 10 can do what a general-purpose computer takes 100 arithmetic operations to accomplish. This speed is a major factor in reducing the time it takes to obtain an answer from several weeks to several minutes. The two AD 10s share the task, with one handling the neutron kinetics, for instance, while the other works on the hydraulics. When they need to communicate, the data is transmitted through a high-speed, 20-MHz, 16-bit bus that runs under the floor between the two telephone-booth-sized machines.

The staff also uses the PC to prepare and store certain kinds of data that are then passed through the PDP to the AD 10s. One example of such data is the scaling factors. The AD 10s only work with whole

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CIRCLE 178 ON READER SERVICE CARD

(continued)

```

MOV     DX,OFFSET PATHS+300      ;Read into data area at Paths+300 bytes
MOV     CX,LEN                   ;Read the full file's length in bytes
MOV     AH,3FH                   ;Read it in at last
INT     21H
MOV     NUMBER,AX                ;Number of bytes actually read.
MOV     AH,3EH                   ;Close file
INT     21H
MOV     BX,OFFSET PATHS+300      ;Clean up the Word Star high bit.
MOV     CX,LEN                   ;For the full file
CALL    WS                       ;Strip high bit for ws
POP     DX                       ;Pop evrything and return
POP     CX
POP     BX
POP     AX

READ_FILE      ENDP
PATHS:         ;Here's the end of program marker

CODE_SEG      ENDS
END           ENTRY              ;End 'Entry' so DOS starts at 'Entry'

```

(Figure 2 ends)

Your Own PATH.DAT File

A typical PATH.DAT file might contain the following:

```

\WORK(cr)
\LEVEL1(cr)

```

You simply enter every additional path you want searched, making sure that each one (including the last) is followed by a carriage return. In the example above, if you're on the C: drive, LOCATE will search C:\WORK and then C:\LEVEL1. If you wanted to look at the diskette drive too, you would include it by adding A: (also followed by a carriage return):

```

\WORK(cr)
\LEVEL1(cr)
A:(cr)

```

One reason, indeed, that LOCATE uses PATH.DAT is that this keeps the program (and thus the number of bytes to type in) much shorter. Assembly language is built to do many things exceptionally well, but the type of *in situ* pathname editing necessary to dig deeper and deeper in a hard disk's subdirectory tree is not one of them. To search each subdirectory without an external PATH.DAT file would make LOCATE's already massive bulk (517 bytes) even more massive, all to traverse paths that often should not be searched anyway.

LOCATE is thus designed to be used

under DOS version 2.0 and later; earlier DOS versions do not support pathnames. When IBM introduced spacious hard disks, subdirectories (and paths to track them down) became a practical necessity, and DOS had to start looking at file handling in a significantly different way. Instead of using rigid, 37-byte File Control Blocks (FCBs) to open and read files, the later versions of DOS employ a dynamically assigned 16-bit (one "word") file handle. Among their other virtues (the subject of a future column in this space), file handles permit the relatively easy addition of pathnames and allow the programmer to read a selectable number of bytes from a file rather than restrict him to a fixed record size.

LOCATE permits you to enter a search string of up to 20 characters. While it returns a total of 40 characters, the remainder are used to provide context. To some it may seem a limitation that LOCATE is case-sensitive. You cannot, for example, find ISHMAEL if you ask for Ishmael, since the former is all in upper case. Suffice it to say (until you start making modifications of your own) that I decided that adding code to provide case-insensitive searches simply wasn't worth it.

While you can, of course, choose to search the entire disk, as a routine procedure you're likely to find that exasperatingly slow. It takes a lot of time on the PC

to read in every file on a disk and scan each individual byte; by specifying which paths to search and in what order, you can usually save a lot of time.

Just as search strings must be supplied exactly, so must pathnames. If a path is incorrectly specified or doesn't exist on that disk, LOCATE just ignores it. By using a PATH.DAT file you can expand LOCATE's range to include as few or as many paths as you like, so long as the overall length of the PATH.DAT file isn't more than 300 bytes.

The Results

Once the phrase you've been searching for has been found, it's easy for LOCATE to print it out, since it already has the whole file in memory. All it does is reach back a few characters and ahead a few and print them all out. Awkward characters, such as carriage returns, line feeds, or tabs are first converted into spaces so the entire display will fit on one line. If you happen to hit a bonanza and get match after match scrolling off the screen, you might want to use the DOS utility MORE, which will stop at a screenful and wait until you've finished reading it.

For the rest, operation is so easy that the hardest part of LOCATE is typing it in. Once past that hurdle, you'll be able to find anything anywhere, even if you're as file-foolish as Rosetta Stone. ■

NUCLEAR SIMULATION

numbers or fixed-point arithmetic, which increases their calculation speed considerably. But since the AD 10s use 16-bit words, the largest number they can work with is plus or minus 32,000. Yet much larger numbers have to be calculated; for instance, steam pressure might easily be more than 32,000 psi.

Stan Lekach, a scientist who has since moved to Soficon in San Francisco, used the PC to solve this problem. "By having it divide the values for each parameter by an experimentally determined constant, each value, as well as the results of the calculations in which it is used, will never be greater than plus or minus 32,000. After doing the calculations, the PC scales them back to their real values."

Another type of data stored on the PC or on a floppy disk is the long list of parameters describing a particular reactor. From there it can be passed to the simulation program in the AD 10s.

Going Digital

The reactions and processes actually taking place in a nuclear power plant occur in analog rather than digital form: steam pressure and temperature both change in a smooth flow instead of in discrete jumps. To mimic this change, the AD 10s, which are digital machines, can input and output analog data, making the conversion to and from digital themselves. These inputs, also called transients, are the elements in a nuclear plant's processes that are temporary and can be altered. For instance, steam flow and pressure are both transients that the system can alter by opening or closing valves. The usual practice is to set two of these transients in a steady state, then vary an element such as a valve to see how it affects the transients.

In the office, near the PC, is an analog input control panel—a metal board about 3 feet high and 2 feet wide—that sports an array of dials. Until Stan Lekach started programming the XT, the team always used this panel to set the level of inputs into the simulation program. Now it can also use a menu on the PC to set the transients. By pressing a key, the researcher rolls through the list of inputs and can then type in the value. The PDP sends these digital inputs to the AD 10s, bypassing the analog-to-digital conversion.

The PC can handle analog or digital outputs from the AD 10s, and both forms of output are useful. One of the first programs Lekach wrote for the PC was for accepting analog outputs from the AD 10s, bypassing the PDP. As he explains, "The AD 10s were already dumping analog output, so I could tap this data without slowing down the simulation at all." He rigged up a small panel that gathers 16 analog channels coming from the AD 10s. He then connected these to a Tecmar Lab Master board in the XT, which does digi-

Fortunately, a nuclear power plant does not have to be in dire straits before a simulation program would be useful. By running simulations of a plant as it is currently designed and administered, plant managers can consider possible preventative measures.

tal-to-analog conversions. Using C language, he programmed the Tecmar board to convert the outputs and store them on the hard disk. Lekach says he chose the DeSmet C compiler, sold by C Ware in San Jose, California, because of its fast compilation time.

Later, Lekach programmed the PC to accept output that had already been converted to digital format by the AD 10. In this case, more than 80 outputs, rather than 16, are available to the XT. This large number of values takes up memory and would slow down the simulation if the PC had to take the time to store all of them. So instead of storing these outputs on the PC, the PDP acts as a virtual disk for the PC, holding the outputs until a researcher makes a request to see them via a menu on the PC.

It isn't redundant to have both methods, explains Lekach. "The analog output lines have high speed, so they are good when a transient has high oscillations and you want to capture each change. The digital

output is useful when you need to compare many different values."

Graphic Simulations

From the beginning, Dr. Wulff's group has used an oscilloscope and its plotter to make graphs of the output values. "The problem," says Dr. Wulff, "was that they didn't have any labels. We couldn't show axes with labels for time, pressure, or temperature. So we turned to the IBM PC." Nor could the graphs be readily plotted in color. Lekach's C programs for the PC solve both these problems.

Using either digital or analog outputs, the researcher follows a series of menus to select which transients to plot. The correct labels automatically appear on the axes, as do the appropriate scales, so that the full graph will fit onto the screen. The two transients are always presented in contrasting colors. Even though the color helps, the team decided to limit each graph to two transients, since the lines become difficult to distinguish with more than two. The analog outputs are actually voltages, and in this case, the PC does the additional task of converting the voltages directly into screen coordinates.

The graphs, which are drawn as the simulator runs, are an impressive demonstration. In one example, Dr. Al Mallen, a scientist working for Dr. Wulff, set particular levels of steam flow and pressure as the transients, and the labeled axes appeared on the PC monitor. The two curves, the steam flow line represented in red and the pressure line in green, began moving in parallel horizontally across the screen. Then Dr. Mallen chose a particular valve from the list of transients and toggled a key to close it. The red flow curve immediately began to drop as it moved from left to right across the screen, and the green pressure curve rose sharply. This pressure increase caused the simulated safety valve to open, and as a series of valves opened and closed in response to the change in pressure, the flow curve rose and fell accordingly.

In an even more dramatic scenario—the kind that HIPA can help plants avoid—Dr. Mallen disabled the control rods so that they could not go into the core. The green pressure curve began to rise, causing the simulated pressure-release

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Fundamentals of Fractals, Part 2

With the fractal algorithm, even micros like the PC can create graphic models of irregular, real-world objects.

In a previous column (*PC*, Volume 3 Number 22, 1984, p. 380) I discussed some of the problems of describing irregular surfaces in terms a computer can model. One possible approach—the Koch generator—was examined, but its curves turned out to be too regular for the real world. We need, rather, to find a way of introducing what might be called *controlled randomness* into our mathematical description of things.

Early approaches to modeling real-world phenomena required enormous data bases, contour maps, and hundreds of thousands of polygons—at a commensurate cost in computer time and capacity. In the past decade, however, new techniques have been developed that can produce complex models from very small initial data sets. The preeminent method, or algorithm, is fractal (from "fractional dimension") analysis. The technique was developed at IBM by the French mathematician, Benoit Mandelbrot. While the full implementation of this algorithm uses massive quantities of calculations and is most often done on large mainframe computers, its flavor can be savored on the PC. With the arrival of better monitors and the new graphics boards from IBM and others, we may even be able to approach the quality of the work previously restricted to the larger machines.

Various researchers have developed algorithms for using fractals to describe real-world surfaces in computer animation. While Mandelbrot formulated a mathematical method for calculating a fractal surface, his method is less satisfactory when applied to computer animation. One

1985/no. 11



major problem is its inability to force the curve to pass directly through certain points—the specific elevations shown on a topographic map, for example. Another difficulty has arisen when the process is reversed: if the picture scrolls up, then reverses and scrolls down, two different images are created. Additionally, Mandelbrot's original method also lacked the ability to zoom into or out of selected areas. All these capabilities are required if the algorithm is to be useful for animation.

To sum up, then, the required algorithm must provide detail when requested, but without the need to store millions of data points. It should be reversible so that landscapes can remain stable. It must also be able to force a curve to pass through specified points. All these demanding requirements are met by the fractal subdivision method.

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PROGRAMMING

The Fractal Algorithm

If we were to write a program that randomly drew lines on the screen, chances are slim that this program would draw a model of a mountain or a river. What we really need in order to create computer models of complexly shaped natural ob-

jects like mountains and rivers is a means of generating controlled randomness. This is what the fractal algorithm provides. For example, we can divide the three-dimensional surface of a mountain range into a series of cross sections. If we then take successive slices of the range and overlay

them, we will get a crude, poorly defined picture of the mountains. Using fractals, however, we need only loosely define the general shape of the range; we can then let the algorithm fill in the details. This is what the **FRACTALS.BAS** program shown in Figure 1 does.

```
10 '=====
20 ' Fractals
30 ' generate fractal curves using recursive midpoint reduction
40 ' copyright 1984, s m estvanik
50 ' 9 JULY 84
60 '=====
70 ' m = number of points on a line
80 ' p = x location on a line
90 ' h = height at that value of p
100 DIM MP(12),P(12,12), H(12,12), T(20,200,2) 't(nlines, pts per line)
110 DIM STACK(40,4) 'used to simulate recursion
120 '
130 KEY OFF
140 GOSUB 1000 'get values for lines
150 RANDOMIZE (VAL(RIGHT$(TIME$,2)))
160 '
170 GOSUB 2000 'preview graph
180 ' calculate fractals for each line requested
190 FOR K=1 TO NLINES STEP 2
200 N=0
210 FOR I=1 TO MP(K)-1
220 SP=1
230 STACK(SP,1)=P(K,I):STACK(SP,2)=P(K,I+1)
240 STACK(SP,3)=H(K,I):STACK(SP,4)=H(K,I+1)
250 GOSUB 2500 'call fractal calculator
260 NEXT
270 MP(K)=N 'number of points calculated
280 LOCATE K,5:PRINT "Line";K;",";MP(K);"points calculated"
290 NEXT
300 FOR K=2 TO NLINES-1 STEP 2 'interpolate
310 LOCATE 14,20:PRINT "interpolating line";K;
320 IF MP(K-1)<MP(K+1) THEN MP(K)=MP(K-1) ELSE MP(K)=MP(K+1)
330 FOR I=1 TO MP(K)
340 IF T(K-1,I,1)=0 OR T(K+1,I,1)=0 GOTO 370
350 T(K,I,1)=(T(K-1,I,1)+T(K+1,I,1))/2
360 T(K,I,2)=(T(K-1,I,2)+T(K+1,I,2))/2
370 NEXT
380 NEXT
390 GOSUB 3000 'plot lines with hidden line removal
400 END
1000 '===== get data for lines
1010 READ NLINES,M '#lines, points per line
1020 DATA 9,7
1030 READ XMAX,YMAX 'max values for x,y
1032 FOR I=1 TO NLINES STEP 2:MP(I)=M:NEXT
1040 DATA 35, 100
1090 FOR K=1 TO NLINES STEP 2:FOR I=1 TO MP(K):READ H(K,I)
```

(continues)

Figure 1: The **FRACTALS.BAS** program. As a start, use roughness = 5 and tolerance = .5.



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| GRAPHICS CARDS: | Amdek, Hercules, IBM, PCjr., Quadram, Scion, Tecmar, STB, Paradise. |
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| OUTPUT: | Printers: IBM/Epson graphics, Epson FX-80 and 100, MX 80 and 100, IDS Non-Color, IDS Prism Color, NEC 8023, C-Itch 8510, Okidata 8X or 9X series, Radio Shack CGP-220, Xerox 1770, PrintaColor TC1040, Quadram Quadjet, Transtar Color, Diablo C150, Tektronix 4695, HP Thinkjet, Star Micronics, Epson JX-80, Data Products 8050, IBM Color printer. Plotters: HP 7475A and 7470A. |

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```

-E 2ACA
5308:2ACA 75.72
-E 2ACE
5308:2ACE A8.D8
-E 2ACF
5308:2ACF 81.C8
-E 2AD0
5308:2AD0 74.73
-W
Writing 5388 bytes
-Q

```

(Figure 3 ends)

It's faster to use ROR (ROTATE) than TEST, and both serve the same purpose. The Jxx (JUMP) instructions also need to be changed, since the carry flag rather than the zero flag will become an indicator.

To make the changes, follow the instructions in Figure 3. Type in everything underlined, and hit the Enter key at the end of each line. When you're finished, type in U 2AC4 2AD0 and make sure your screen resembles the assembler code in Figure 4. Remember to ignore the four leftmost numbers in each line. And you won't see the comments at the end of each line; these are for your convenience only.

One small point: The actual instructions entered are JC and JNC, although DEBUG shows these as JB and JNB. The instructions are coded the same; DEBUG chooses to refer to them with a B rather than a C in their labels.

```

xxxx:2AC4 BADA03 MOV DX,03DA ;point to proper address port
xxxx:2AC7 EC IN AL,DX ;get the current status
xxxx:2AC8 DBC8 ROR AL,1 ;is it low?
xxxx:2ACA 72FB JB 2AC7 ;no, so loop until it is
xxxx:2ACC FA CLI ;disable the interrupts
xxxx:2ACD EC IN AL,DX ;get the current status
xxxx:2ACE DBC8 ROR AL,1 ;is it high?
xxxx:2AD0 73FB JNB 2ACD ;loop until it is

```

Figure 4: Unassembled WordStar code (SW.COM) after the changes have been made. Ignore the four X's at the left of each line. The comments at the right will not appear if you use DEBUG to unassemble the code.

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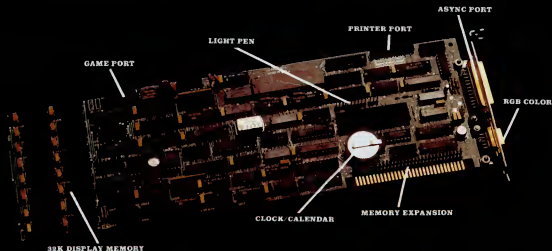
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USER-TO-USER

To see the difference, first run **WS.COM** and then **SW.COM**. Try reformatting a long file with **"Q"Q"Q"**, and measure the time it takes. Although the screen changes are still not instantaneous, there is a significant improvement.

Michael L. Hoyt
Solsberry, Indiana

This does seem to speed up WordStar's screen displays, but the difference is not astounding. On our AT, the increase was about 15 percent. Still, every little bit helps.

Subdirectory Magic

*DOS allows users to organize their files by pigeon-holing everything away in nested subdirectories. But DOS doesn't provide a convenient way to rename directories. To rename a directory, most users create a new one with the new name, copy all the files into it from the old one, and remove the old one—or they take advantage of special utilities like those published in PC Magazine's Programming Column. Advanced users can zip into the disk directory with **DEBUG** and revise any filename.*

*However, DOS 3.0 users can change any subdirectory name simply by going into **BASIC 3.0** and using its **NAME** command. For instance, to change the name of the DOS subdirectory **\SALT** into **\PEPPER**, all a **BASIC 3.0** user need type is:*

NAME "SALT" AS "PEPPER"

*Note that this works only in **BASIC 3.x**. A subdirectory name is handled very much like other filenames, except that byte 11 of its directory listing is a hex 10. Incidentally, by using **DEBUG**, you can hide the subdirectory listing by changing this byte from a **&H10** to a **&H12**.*

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PC Magazine
April 2, 1985

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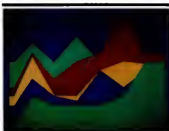


Figure 2: The starting-point, outline view of the Grand Teton.

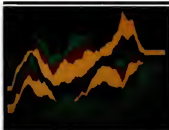


Figure 3: The same vista, following application of the fractal algorithm.

the degree of distortion (jaggedness) to be added. Not surprisingly, low roughness graphs will be smoother than high. Tolerance is the degree of fineness to be calculated. Low tolerance factors result in a greater number of calculations between the initial and the final graphics screens but correspondingly produce smaller intervals between segments. When you run the program, vary these parameters to see their effects on the graphs.

Subroutine 2000 presents the data as initially entered. $P()$ and $H()$ are arrays that hold the initial X and Z coordinates. The X direction is left to right; Z is up and down. The Y direction is forward and backward in the plane of the monitor screen. In this program the Y coordinates are assumed to vary uniformly.

Subroutine 3000 does the actual plotting after first scaling the values to fit on a medium resolution screen of 320 by 200 pixels. After each line is drawn, the PAINT command is used to fill in the area below the curve. This acts as a crude method for hidden-line removal.

The meat of the main program is in lines

200-260. The coding would be simpler in Pascal, C, Fortran, or other languages designed for recursive calls. In BASIC, however, we need to define a stack explicitly. The array STACK keeps a list of four items: the horizontal and the vertical measurements for a line segment. To get things going we enter the values for the first two points and call the fractal subroutine 2500. SP is a pointer to the element of STACK that we're currently working on. The fractal subroutine will then add more items to the list in STACK (pushing) and take some off (popping), as required.

At each recursion we transfer the contents of STACK (SP,n) to four temporary variables. There's no further need for those items in STACK, so the stack pointer is reduced by one. (We've just popped the stack.) Next, we test to see if the two T values are within the tolerance level. If they are, then the calculated values can be added to the list of final values that are being kept in the array T(). The WHILE condition is then checked. If the stack contains any more items, the next one is popped and the subroutine continues. Eventually, the stack is empty and control then returns to line 250.

The interesting part of the algorithm, though, is what happens if the tolerance level isn't met. In this case two new values are calculated. First, an intermediate T is found. This is simply the mean of the two values that were popped from the stack. An intermediate height is also found. This new height (line 2630) is dependent on more than the two previous heights. It is also displaced by an additional amount that is related both to the roughness variable and to a random factor. This gives us two new sets of points to calculate—the intervals from T1 to TM and from TM to T2.

These values are pushed onto the stack and the process continues: ever smaller line segments will be defined and pushed on the stack. Eventually, however, they become small enough to meet the tolerance. At that point we work back up the stack, popping new sets off. In the end we have a list of n points that can be plotted.

Before plotting a second time, however, the program does an interpolation (lines 300-380) to generate additional slices. As stated earlier, this is a simple linear interpolation; a program refinement would be to apply the fractal algorithm here too.

Eldorado

One set of data is rarely enough to prove a point or validate an algorithm. A second set of data points creates another view. (If one set of data works and a second set works, by The Programmer's Rule of Induction the program always works.) This second data set presents a view of the Washington Cascades, showing Eldorado Peak and the Triad. To use this second set, just delete lines 1000-1250 of the original program and enter the lines shown in Figure 5. As a starting point, I recommend you use a roughness factor of 7 and a tolerance of .7.

The Last Fractal

The great value of fractal methods is that they allow highly complex objects to be drawn by simple rules and from a minimum of data. Further, if the same seed is used for the creation of a fractal landscape, the pattern created will be the same even if the view screen moves on and then comes back. This effect was used in the recent movie *The Last Starfighter* during the chase inside the asteroid. The caverns on the screen were created by fractal tech-

```

Procedure fractal(t1,t2)
Begin
  If t2 - t1 > tolerance THEN
    tm = (t1 + t2) / 2
    hm = (h1 + h2) / 2 + roughness * (t2-t1) * random factor
    fractal(t1,tm) ' recursive call to same routine
    fractal(tm,t2)
  ELSE
    plot current values
  End

```

Figure 4: The fractal algorithm in logical form.

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type in the characters within the parentheses). For example, the DOS default prompt you're used to would be entered as **PROMPT \$p\$g** if you had to create it.

Issuing the command

PROMPT \$p\$ \$n\$g

gives you a two-line prompt that shows the current drive and subdirectory on the first line and the usual drive:> on the second.

I sometimes use the following prompt command:

**PROMPT \$p<tab><tab><tab>
Time...\$t\$h\$h\$h\$h\$h\$h\$h\$h\$g**

This prints the name of the current directory, a few tabs (you just hit the tab key where you see <tab> above), then the string "Time . . .", followed by the time of day. The \$h backspaces and erases the seconds, which would be more information than I want. Finally, the \$g produces a new line with a > sign on it. This is handy for project billing since a screen printout clearly shows me what application is being run and how long I have spent running it.

I think you'll find that it is both fun and instructive to experiment with the **PROMPT** command. If you decide you want to use a customized prompt regularly, however, you must make the **PROMPT** command sequence a part of your **AUTOEXEC.BAT** file, since otherwise DOS will go back to its normal default prompt each time you boot up.

RAMdisk Mystery

Q: I tried to install the RAMdisk device driver (listed in the IBM DOS manual) on my IBM PC, which has 128K, two 360K floppies, and a monochrome display. I reduced the size of the RAMdisk from 180K to 30K.

While it seems to be working, I have encountered two mysterious problems when the RAMdisk is installed.

(1) The F3 function key doesn't work after execution of external commands (.COM and .EXE), but it works fine after internal commands (DIR...)

(2) When I am using DEBUG, the T and G commands don't work: after the first step (T1) CS, AX, and IP assume a value of FFFF.

Are these problems of far memory references, problems of interrupts, or what? Can I do anything about them?

Sergio Margarita
Turin, Italy

A: I think that your problems both stem from the same source: lack of memory.

The F3 key, which is used to repeat a previous command line, will only work correctly if the **COMMAND.COM** command processor is not overlaid by whatever program you run. Overlaying the command processor is a common occurrence and nothing to worry about, but the problem you are having is one distasteful side effect. The command processor normally resides in high memory and gets overlaid only by programs that need that much memory. Since internal commands, such as **DIR**, are run directly from the command processor, they will rarely overlay—though you might check the operation of the **COPY** command.

Before getting to the second anomaly you are experiencing, let's examine your memory map. You don't say which version of DOS you are using, but since the device driver is listed in the 2.0 manual, I will assume that version.

DOS 2.0 takes up about 25K of memory. Include your 30K RAMdisk and you have about 68K of memory left over, since the RAMdisk program itself takes up some memory. If you have any disk or communications buffers in use, this can eat up even more. Thus, by the time you are finished, any program that uses up more than 30K (that is, most of them) will overlay the command processor.

Turning, then, to the second part of your problem, you must consider that **DEBUG** itself takes up more than 12K of memory. This leaves only perhaps 50K of memory for your programs. If you try to debug a larger program, you will run out of memory. Upgrade to 256K of memory, and these problems will disappear.

Plotter Driver

Q: I have been using a BASIC program to drive my Amdek DXY-100 plotter. When I bought the plotter, it was told this subroutine was required by my IBM PC to "manually toggle the strobe," since the PC print routines normally send data to a

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```

1000 '====Eldorado Peak===== get data for lines
1010 READ NLINES,XMAX
1020 DATA 4,25
1030 NLINES=(NLINES*2)-1 'leave room for interpolations
1040 FOR I=1 TO NLINES STEP 2:READ MP(I):NEXT 'data points for each line
1050 DATA 9,8,6,6
1060 FOR K=1 TO NLINES STEP 2:FOR I=1 TO MP(K):READ H(K,I)
1070 H(K,I)=(H(K,I)-8000)/25 'scaling
1080 NEXT :NEXT
1090 YMAX=(15000-8000)/25
1100 'Heights for each line, starting at farthest from view
1110 DATA 12400,12900,12300,12350,11400,11700,12325,11200,10400
1120 DATA 12000,13200,13220,12000,11200,10300,10800,10000
1130 DATA 11600,12200,10800,10000,9600,9200
1140 DATA 12100,10800,11200,10400,9400,9200
1150 'horizontal distances across each line
1160 FOR K=1 TO NLINES STEP 2:FOR I=1 TO MP(K):READ P(K,I):NEXT :NEXT
1170 DATA 7,8,10,13,15,18,20,22,25
1180 DATA 1,3,5,7,10,15,20,25
1190 DATA 1,5,10,15,20,25,1,5,10,15,20,25
1200 CLS:INPUT "Roughness (2-10)";RUFFNESS
1210 PRINT "tolerance (min"; 2*NLINES/100;"");:INPUT ;TOLERANCE
1220 YINC=60/NLINES
1230 XINC=100/NLINES 'scaling factors for transforms
1240 RETURN

```

Figure 5: An alternative data set for FRACTALS.BAS, (roughness = 7, tolerance = .7).

niques. As the spaceships rocket through the internal corridors, they cover terrain that is continuously variable, yet is entirely retracable. The effect is to generate an enormous area from just a small descriptive data base. The sparse initial dataset simply grows to become as detailed as needed. If desired, we can also zoom in to look at a smaller section; whatever level we choose to view, the detail will be there.

Fractal Applications

In a motion picture laboratory, after establishing the 3-dimensional grid, a rendering program assigns shading values to make the terrain look more natural. Further refinements then add landscape details, such as shadows, haze, or snow-capped peaks. Through the use of fractal techniques, the time required to create a frame of animation has steadily been reduced, from an hour to less than 5 minutes.

Additional applications that could profit from fractal techniques include training simulators for pilots and others who need real-time 3-dimensional images. Major studios may find it more profitable to generate exotic sets rather than shoot on loca-

tion. Further, both for movies and advertising, mixing live film with fractal-based animation provides worlds and angles impossible for physical cameras.

Of course, there are some practical limits. It still takes 24 frames to form a second of elapsed film time; and the costs of pro-

Fractal techniques will find their way into computer games written for more-powerful micros such as the IBM PC.

ducing computer-generated animation are still inhibiting. A Cray X-MP can produce about 20 minutes of 70-mm film a month. Previous minicomputers were hard pressed to make 2 or 3 minutes of quality film in a year, however, so the economic balance is tilting in the right direction.

And, of course, the PC is no Cray. Nonetheless, fractal techniques will find their way into computer games written specifically for more-powerful micros, such as the IBM PC. More-realistic terrain

can now be modeled, for example. No longer need the lazy-programmer approach be taken, in which scrolling is limited to one or two directions. Fractals permit wider expanses of more detailed terrain and guarantee that the terrain will remain the same no matter the direction from which the player approaches or how many times he's been there before. By varying the pitch and altitude, even in primitive programs, you can achieve relative changes in perspective and angle of approach that mimic flight.

So, to get started in this new graphics dimension, key in Figure 1 or the modem number (212-696-0360) of PC's Interactive Reader Service. For more information, see the following sources: Loren C. Carpenter, "Computer Rendering of Fractal Curves and Surfaces," Computer Graphics: SIGGRAPH '80 Conference Proceedings, July 1980; Benoit B. Mandelbrot, *The Fractal Geometry of Nature* (San Francisco: W.H. Freeman & Co., 1982) (this field's current classic); Benoit B. Mandelbrot, *Fractals: Form, Chance and Dimension* (San Francisco: W.H. Freeman & Co., 1977). ■

User-to-User

PC readers use this forum to help one another by passing along their questions, solutions, comments, and complaints.



Low-Resolution Graphics

IBM's *Technical Reference* manual briefly describes a low-resolution graphics mode of 160×100 in which all of the available 16 colors can be displayed. The manual further references a special memory map and setup to be defined later. The manual is wrong in stating that this mode is set up as a 40×25 alpha color mode—it's actually an 80×25 alpha mode.

The special setup consists of presetting the even-numbered bytes in the color graphics buffer with ASCII code 222. The character is halved vertically and displays the foreground color on the right side and the background color on the left. The halving of each character yields 160 pixels across the screen. The 6845 controller is programmed to display only one-fourth of each row or two scan lines. This programming yields 100 fourth characters down the screen. The color of each pixel is controlled by the odd-numbered bytes of the color graphics buffer. This is the 8,000 bytes referred to on page 2-56 of the (July

1982) *Technical Reference* manual. As in text mode, each byte represents two pixels: the high nibble determines I, R, G, B for the left pixel and the low nibble provides I, R, G, B for the right pixel.

The accompanying programs demonstrate the use of low-resolution mode. The preliminary program MAPMAKER.BAS in Figure 1 demonstrates how to get into low-resolution mode. It also creates a memory map for the main drawing program, LORES.BAS, in Figure 2. In LORES, the keys 2, 4, 6, and 8 on the numeric keypad move the line you're drawing, while the plus sign and minus sign change the color. The 5 key on the keypad toggles XOR mode on and off, where a white cursor (or black on a white background) is able to move but does not disturb the images it crosses or leave any trail.

The L and S keys control LOAD and SAVE functions. Simply hit the S key and then one letter or number, and the image on the screen will be BSAVED with the name PIC#.BIN, where # is the key hit immediately after S. Make sure to hit a key that is valid for use as a filename. (The small help screen included with the program suggests using numbers only, but any valid character will work here.) To BLOAD a key you've saved previously, hit the L key and then hit the key originally used to save the image. To exit the program and return to normal text mode, hit the space bar.

LRGMEM.MAP is a binary copy of the special memory map used by LORES to save execution time. MAPMAKER writes the map byte-by-byte into memory

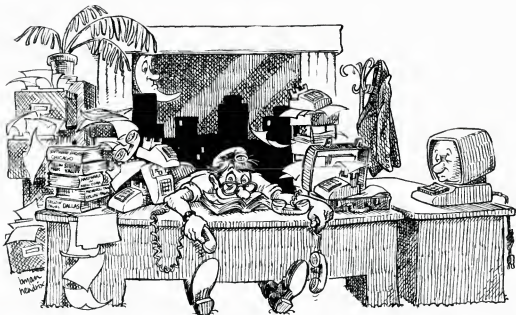
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But where the problem is a slight touch of undercapitalization, overextension, mild mismanagement, or some debilitating but nonfatal business disease, the law offers a second chance. Not a fresh start—the old creditors would be a bit testy to be brushed aside—but Chapter 11 of the federal bankruptcy law offers a shaky company protection from hungry creditors in exchange for a resolution to mend its profligate ways and sign up for a spartan financial regime.

Devising this new financial regime is where the microcomputer's capacity to crunch and crunch a vast array of numbers in seconds pays off handsomely.

The Reorganization Model

For the past year, Susan Hiller, Wharton graduate and British-chartered accountant with the New York office of Arthur Andersen & Co., has used Lotus's 1-2-3 on an IBM PC to develop a detailed, 500K template that serves as a



model for creating and evaluating bankruptcy/reorganization plans. Although the package is not yet available commercially, you can obtain more information about it from the New York office of Arthur Andersen & Co. at (212) 708-4000.

The Reorganization Model is a comprehensive financial forecasting and restructuring package that helps formulate a plan of reorganization, assists in negotiations with creditors and other parties (employees who want to keep their jobs, major customers who need to keep the company's product alive, shareholders and so on), and facilitates confirmation of the reorganization plan (the judge at bankruptcy court wants to know not only that all the parties are willing to go along with the plan but that the plan has a good chance of working out as it stands).

To come under the jurisdiction of Chapter 11, the shaky company and its creditors have to negotiate a plan that stretches out payment of the company's bills over a period long enough to allow them to be paid from the proceeds of the company's operations. Sometimes, it's necessary to sell off parts of the business. In deciding where to stretch and where to trim, the Reorganization Model juggles a lot of dependent variables with great aplomb.

Juggling the Variables

The menu-driven Reorganization Model starts with the balance sheet at the time of the plan, then projects income, expenses, and capital adjustments for the years that the plan will go on. The first step is to enter the current balance-sheet values. Usually these are book values, but where book values are seriously out of date, current values can be used based on fresh appraisals.

You then begin putting in the future operating and financial assumptions from which the Reorganization Model can project revenues, working cash flows, taxes, and profits over the proposed workout period. If the company has net operating losses, you can see the utilization of those NOLs for tax purposes. Finally, you feed in all the claims by category: secured, priority, unsecured, preferred equity, and common equity.

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after receipt; what percentage of customer accounts it expects to collect within 1, 2, or 3 months; and what percentage will have to be written off.

The critical judgments come when you start entering the proposed payouts to claimants. Decisions about whose claims are deferred and whose are reduced are at the heart of negotiating a plan of reorganization.

Passing the Bar

When Hiller was working with a client to draft the terms of a reorganization plan, she filled in the numbers and put up a graph comparing the payouts under the plan and upon liquidation. "When we saw that the green bar, which represented the amount to be paid creditors under the plan, was lower than the red bar representing liquidation value, we could immediately reject the scenario," she says. "It meant the creditors would get less after the workout than if we just liquidated right away. The plan was not feasible since we knew none of the creditors would vote for it." The strong point of the graphs in the Reorganization Model is that the relationships hit you right away, without your sifting through pages of numbers.

The key question from a creditor's standpoint is, What's in it for me? For example, if you are a creditor about to be compensated in notes, the Reorganization Model shows you the dollar amount you'll be paid. Then it calculates the present value from the principal amount of the notes, taking account of the number of years over which the notes are to be repaid—receiving \$500,000 in 5 years isn't as valuable as receiving, say, \$300,000 right away, assuming a 10 percent discount rate. If you're going to be paid in convertible notes, the Reorganization Model will estimate the value of the securities in the year the conversion takes place.

A plan can state that if earnings reach more than a specified amount, the original creditors can share in the company's surplus earnings after that point. The Reorganization Model can show you what additional payments you would get as a creditor as the profits exceed a series of targets.

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USER-TO-USER

keyboard interrupt routine is made. If the Ctrl key has been pressed, then the keyboard is sent some signals, via the OUT command, to cause it to reset and forget that the key was pressed. The registers are all restored and an Interrupt Return is made.

If a different key was pressed or a key was released, a jump is made to the original keyboard routine. All registers must be kept in their original state; so the jump to the keyboard routine is coded directly rather than with a JUMP instruction. CTRLLOCK will work fine in conjunction with *Prokey* or any other program that attaches itself to DOS and looks at keystrokes. CTRLLOCK should be run *last*, however, after *Prokey* is installed.

You could change the test to look for any other key or multiple keys. One change might be to have it ignore the Esc key. Pressing Esc causes *dBASE II* to break out of command files. Ignoring this key would force a *dBASE* command file to keep executing and prevent an exit to *dBASE* itself.

The CTRLLOCK.BAS BASIC program in Figure 3 creates an executable version of CTRLLOCK called CTRLLOCK.COM. Just key the program in and run it.

Joe Dornier
Temecula, California

CTRLLOCK.COM does disable the Ctrl key (which can be maddening if you're using WordStar) and keeps users from rebooting or stopping the execution of a program. (However, certain programs such as Sidekick override this and restore the Ctrl key's effectiveness, or may have other unpredictable results.) But it comes in handy if you want to prevent other users from breaking out or rebooting.

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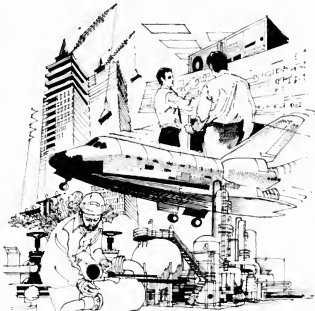
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Model is in selling a bankrupt company's plan to groups of creditors with diverse interests. Hiller has presented the Reorganization Model to a conference room full of clients with the computer connected to a large Sony projection screen. She says, "From the company's point of view, the program is most effective during the heat of negotiations. If one of the creditor groups is pushing for a payment that the company knows it can't make, the company can plug the numbers for the creditor's proposal into the Reorganization Model right then and there. In a matter of seconds, the screen can show how the proposal favors one creditor group, pulling it out of line with everybody else, or showing that the payment will eat up all the cash so there won't be enough for operations during the work-out period. The model can counter a bad idea, graphically, in moments."

Two bar charts demonstrate this ability dramatically. The graphs start by showing, in blue, the claims of four categories of creditors. Next, it shows, in red, what the creditor would get if the business were immediately liquidated, the assets sold, and the proceeds distributed. Then a green bar shows the total amount the creditor will get if this plan is approved. Finally an orange bar shows the present value of the current and future payments under the plan. One chart shows the absolute dollar amounts the creditors get, the other shows the cents per dollar of claim that the creditors will receive.

Bankruptcy Conference

The Reorganization Model, which is neutral itself, can be used either by a company in debt or by its creditors.

You can see demonstrations of the Reorganization Model and other software for bankruptcy applications at the Second Annual Conference on Computers in Bankruptcy taking place at the Biltmore Hotel in Los Angeles on May 13, 1985. The conference features a full program on innovations in the use of computers in bankruptcy situations; a seminar of speakers led by Rees Morrison, Esq., a New York attorney; and related exhibitions. For further information, call Daniel Roth at (212) 692-9388. ■

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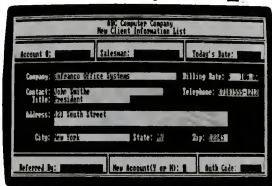
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Banking on Your Computer

Banking with your home PC reduces costs, eliminates teller lines, and makes it easier for you to keep track of your accounts. In the next 5 years, it may affect the banking industry profoundly.

When Ed Goldberg, a broadcast engineer at BBC, first heard about banking through his home computer, he called Citibank and asked to be signed up for the test program. "I knew it was what I needed," he explained. "I hated the lines, and I hated taking time out of the day to go to the bank. Now I do my banking at 2 a.m., sitting at home in my pajamas."

For me the magic of home banking was the ease it brought to managing my money. For years I've known I could open a money market account and transfer funds to my checking account when bills were due, but who has the time to keep track of all that? Then along came Chemical Bank's PRONTO, and it became easy. About once a week I call the bank on my IBM PC, review my accounts, record checks, pay bills, allocate funds among accounts, and even ask questions. Within 24 hours the answer is waiting for me in my electronic mailbox. This feels a lot more personal than waiting in line, and I estimate that I collect an extra \$200 to \$300 in interest annually using PRONTO.

Electronic banking for the home or office is here, and its potential effect on the banking industry is staggering. Five of the top six banks in the country—Chase, Manufacturers Hanover, Bank of America, Citibank, and Chemical—have begun to offer their own personal computer-based banking services in the last 12 months. Chemical is marketing its PRONTO system to regional banks around the country; it has signed up the Union Trust of Stamford, Connecticut,



and is testing the program in seven other banks. Because electronic transfers are not restricted by federal law, any bank could create a national banking system instantly by offering a local telephone number to customers anywhere in the United States. One competitor thinks Citibank is working on such a strategy with the ultimate aim of "establishing a relationship with every man, woman, and child in the free world." But Richard Kennedy, business director for Direct Access at Citibank, says that it is premature to think of going national.

Reducing Costs

Banks are pressed by rising costs, competition from nonbanking firms, and legislation that limits the growth of national banks. Home banking could reduce expenses in banking's major cost

centers, which James Bauer, director of Home Information Services at Manufacturers Hanover, labels "people, paper, and palaces." Charles Forbes, vice president in the Electronic Banking Division of Chemical Bank, expects that within 5 years traffic in branches will be noticeably affected by PRONTO and that banking will change in response. Branches will not cease to exist, but they will become oriented more toward sales and services than toward transactions. Space and personnel needs will decline; so will paperwork and costs. Forbes thinks the system has a way to go before First Electronic Bank, N.A., opens its terminals and telephone lines, but the future is clear.

Chemical's efforts have already paid off. Of the more than 17,000 subscribers to PRONTO, 18 percent are new custom-

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BUSINESS

ers, more than half of whom have annual household incomes that exceed \$50,000. On the average, PRONTO subscribers have twice as many accounts at Chemical as do other customers.

Business Banking

The next step for Chemical is electronic business banking. The PRONTO Business Banker, oriented toward businesses with \$500,000 to \$10 million in annual sales, is being tested now and is expected to be available within 6 months. I asked a friend with a business that falls within this size range if banking by personal computer would appeal to him. He calculated that the loss of the 1-week float—the time it takes for a check he sends out to clear—on his payables would cost almost \$2,000 a month.

However, Chemical has an answer to his objection. The pilot project offers balance inquiry, transfer of funds among accounts, and electronic mail, but does not include bill paying. Chemical is also working on an interface with some of the more popular accounting packages so that businesses will be able to print checks in their offices at the same time that they record the information at the bank and register it in their books. Chemical also will provide an interface for downloading data into spreadsheets. The combination of local and remote processing is a powerful demonstration of the flexibility of these micromonsters.

Home Banking

The weak link in home banking is that the personal computer can't deliver cash. Recently a number of banks have joined together to offer cash to customers through one another's cash machines. But Charles Forbes at Chemical, with a gleam in his eye, has a more enticing answer—a smart card for a cashless world. A nonvolatile memory chip could be built into a credit card and "money" could be deposited on the chip by a personal computer. If the bank registered a withdrawal for a purchase, the amount would be removed automatically from the card's memory.

Forbes has other, more near-term plans brewing as well. Chemical Bank and AT&T have agreed to a joint video-

text venture for home purchasing. Forbes thinks that offering a service like this could make the system more enticing than past videotext attempts.

Other banks see less of a future in home banking than does Chemical. Jim Bauer of Manufacturers doubts that bankless banking will ever become a reality. Bauer anticipates that only 10 percent of Manufacturers customers will use EXCEL, and that number just isn't enough to change the face of banking. Manufacturers is offering EXCEL in response to competition and does not expect it to be a dominant channel for customers. In some ways EXCEL reflects this view. While the Chase, Citibank, Chemical, and Manufacturers programs categorize each check by a budget category to track expenses, only Manufacturers leaves it to you to maintain such data on your own disks. Bauer points out that this method gives customers more privacy and keeps the bank out of the information storage business.

Other banks store such data on their own hard disks, and Chemical, for one, provides a year-to-date summary of expenses with each month's statement. I just received my expense information for 1984, which included the expense descriptions that I write on each check, and my accountant loves it. So may the IRS if it asks to see the statement some day.

Range of Services

All the banks offer similar basic services—bill paying, budgeting, transfers among accounts, balance inquiry, electronic mail communication with the bank—with some variations. Some, like Manufacturers Hanover and Chemical, limit bill payment recipients to businesses. Chemical's merchant directory currently has 2,400 businesses, and Manufacturers has 730 merchants on its list. At your request, both banks will add any business that agrees to accept payment through the system.

Individuals, however, cannot be paid through Chemical's PRONTO or Manufacturer's EXCEL. Chemical prohibits payments to individuals for security reasons. Citibank permits payments to individuals but requires a few days to confirm that such a person is residing at that

address. Both Chase and Citibank will request approval for any payment that appears suspicious.

Security is a major concern both to customers and to banks. Every bank has built-in multiple layers of passwords and user codes and uses diskettes with serial numbers. One Direct Access user I know tried to get into the system with *Crosstalk XVI*, and the system refused to recognize him. All home-banking customers seem to have as much liability as credit card holders. But home banking transactions, unlike those made with credit cards, do not leave carbons behind.

In addition to basic services, each bank offers its own mix of additional services. Manufacturers Hanover offers the *Financial Calculator/Cookbook* from Electronic Arts. These powerful little financial recipes help you figure out, for instance, how much insurance you need or the financial consequences of leasing a car. Chase and Chemical offer stock trading and the ability to follow a hypothetical portfolio—a real-life version of the game *Millionaire* that will definitely get my attention. Chase also has the prettiest system, which includes some graphics and color in the screen formats. Citibank provides access to The Dow Jones News/Retrieval service with no initial password fee and no minimum monthly charge. Chemical also offers electronic mail access to anyone else signed up for PRONTO, a useful service as the number of subscribers grows.

Personal computers make electronic banking possible, and electronic banking could be a major step toward justifying the use of personal computers at home and in small businesses. In the corporate world, desktop computers are everywhere. At last count, Citicorp had 4,812 IBM personal computers. In small businesses and homes, however, the transition to computers has been more gradual because the tasks involved are so diverse and nonspecialized. Computers will enter the world of small business only when the number of small yet significant uses

begins to stack up. Banking by personal computer may become a major addition to that stack. It offers significant savings in time, vastly improved financial management, and access to numerous ser-

vices in addition to those of traditional banking. For many small businesses and potential home users, banking by personal computer could be the argument that wins the case. ■



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Now this discovery poses a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

Double it, most of them aren't manufacturers. Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and passing their labels on the finished product.

The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices... without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications... specifications which are higher than most... and simply create our own "name brand" diskette.

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Restoring Matrix Commands to BASIC

BASIC lost the matrix commands of its Dartmouth progenitor when it was adapted to the micro environment. Now Matrix 100 restores these commands and extends their power.

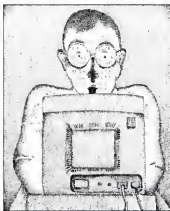
In the beginning, there was the Altair 8800, and creator Ed Roberts saw that it was good. Of course, it couldn't really do anything because this progenitor of all personal computers had only 256 bytes of memory, and no programming language would fit.

Roberts set about to expand the Altair's memory to 4K (4,096 bytes), whereupon a college student named Bill Gates decided to boldly go where no programmer had gone before. He and Paul Allen wrote a BASIC interpreter to fit on a microcomputer.

The result was Microsoft BASIC. It fit in 2K of memory, leaving the other 2K for the program. To grasp the magnitude of their feat, consider that your PC's monitor has 25 lines of 80 characters—the equivalent of 2,000 bytes. Gates and Allen wrote a BASIC interpreter that required no more space than that.

Microsoft BASIC still shows traces of its memory-starved infancy. Although it has clearly grown into the standard for microcomputer BASIC, even today it lacks some of the features of the original Dartmouth BASIC that spawned the mainframe standard—matrix commands, for instance. As a result, doing the linear algebra manipulations that numerical analysts, linear programmers, and other mathematicians need becomes a tedious exercise.

Matrix 100 from Stanford Business Software, Inc., enhances BASIC by adding these missing matrix commands back. The principal program, *MATBASIC.EXE*, first loads a series of matrix routines into memory and then



loads IBM BASIC or BASICA. *MATBASIC* remains resident, acting as an assembly language subroutine invoked by using the *CALL* command in BASIC.

What Maxtrix Does

Matrix routines are dramatically slashed in size when you use *Matrix 100*. In BASIC, for example, a single quotation mark separates the actual matrix function from the *CALL MAT* statement. BASIC therefore regards the matrix function as a remark and ignores it. *Matrix 100*, however, when activated by the *CALL*, reads the "remark" to discover which of its routines to invoke.

This BASIC enhancement is brimming with options. It can, of course, add, subtract, multiply, and invert matrices. In addition, however, it will automatical-

ly solve a system of equations, perform multiple linear regression, factor a matrix into lower-triangular/upper-triangular form, and find QR factors (orthonormal/upper-triangular/permutation). The *INVERT* command also accepts a condition parameter; a large condition number warns *Matrix 100* that a matrix is nearly singular.

With *MATBASIC* loaded and resident in memory, 60,455 bytes of memory remain free even when you load BASIC. *MATBASIC* exacts no memory penalty, as I discovered using the *FRE(0)* command, which told me that BASIC's workspace is the same size whether or not *MATBASIC* is loaded.

Until I read the manual more closely, I thought that I had found a bug in the *DETERMINANT* command. The command actually computes the absolute value of the determinant, never returning a negative number. Peter Lavenhol, vice president of Stanford Business Software and chief programmer, says that Version 1.1—the latest release of *Matrix 100*—implements the more customary signed determinant. It also corrects a bug



Matrix 100

Stanford Business Software, Inc.
4151 Middlefield Road, #215
Palo Alto, CA 94303
(415) 424-9499
List Price: \$80

Requires: IBM BASIC, 128K RAM (192K recommended), one disk drive

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in the original version of the MATSOLVE routine.

Laventhol adds that he is working on support for the 8087 math coprocessor and the BASIC compiler for Version 1.1. The 8087 support will probably be an extra-cost option. Other enhancements Laventhol hopes to make are commands for eigenvalues and graphics.

Matrix 100 is written in C and assembly language. The routines are quick and appear to live up to the claim that they are numerically stable and accurate. Working with *Matrix 100* is exactly like working with ordinary BASIC, except that additional commands are available. Laventhol indicates that problems arise only if you wish to run assembly language subroutines. Such subroutines conflict with *Matrix 100*, though Laventhol says he can easily explain to programmers how to avoid such programming conflicts.

Add-on Packages

Subsequent enhancements to *Matrix 100* should take care of such problems as subroutine conflicts and compiler incompatibility. Stanford Business Software plans to release—in stages—add-on packages that can incorporate *Matrix 100*'s power into a program without overstepping BASIC's customary bounds. The first release will be a library of subroutines that perform *Matrix 100*'s functions in conventional fashion. Instead of using CALL MAT, the programmer simply calls the appropriate subroutine in the standard way. The BASIC compiler understands programs constructed in this way.

Sometime during the spring, Stanford Business Software hopes to unveil a second-stage product that fully restores the programming convenience of *Matrix 100* for compiler users by using the compiler compatibility of its subroutine library. A

utility is under development that will convert *Matrix 100* calling statements into standard CALLs to the accompanying subroutine library. The utility reads the MATBASIC version of a program and generates the PC BASIC translation.

The subroutine library and translation utility for Version 1.1 of *Matrix 100* will be extra-cost items, but no price has been set for them yet.

The 33-page *Matrix 100* user's manual is excellent. Beautifully typeset in multiple fonts for readability, it describes each command clearly, explains any options or parameters, and gives explicit examples. It treats advanced factorization and solution commands separately after the more common routines. A complete list of error messages appears at the end of the manual. Moreover, the format is exactly the right size to slip into your IBM BASIC manual (provided there's any room left after you've finished inserting

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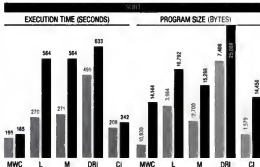
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■—Small Memory Model
■—Large Memory Model

NOTE: Sort program as in Byte, August 1983, p. 91. Register declaration added. Further information on these benchmarks available from Mark Williams Company upon request.

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The three books reviewed here offer programs of varying usefulness for investment analysis. All of the programs are written in BASIC, and each book contains sample input and output, as well as explanations of relevant theory.

Investment Programs

The Computer-Assisted Investment Handbook by Albert Bookbinder contains 50 ready-to-run investment programs for moving averages, exponential smoothing, secular-trend analysis, correlation and regression analysis, interest rates and treasury bills, and so on.

Unfortunately, most of the programs are of little practical value to a serious investor. One program calculates moving averages, which are often used in technical analysis to signal when you should buy or sell a particular security. To use the program, however, you must enter all the data each time you calculate the moving average. This program turns your PC into a mere calculator.

For option traders, the book offers two programs, based on Bookbinder's own research, that present a unique approach

to the valuation of call and put options. Overall, though, *The Computer-Assisted Investment Handbook* is not up to the task of providing practical guidance for using your PC to help you with investment analysis.

Technical Analysis

Curtis Arnold's *Your Personal Computer Can Make You Rich in Stocks and Commodities* begins with a short section on selecting hardware and software and building stock and commodity databases. The recommendations, however, are general and poorly supported, and the section contains some incorrect factual information.

On the whole, the book supplies a good overview of technical analysis and its application to the stock and commodity markets. It came as a surprise to me, given its title, that the book makes only a passing mention of how to use personal computers to assist you in this analysis.



The Computer-Assisted Investment Handbook

Albert I.A. Bookbinder
Programmed Press
2301 Baylis Ave.
Elmont, NY 11003

(516) 775-0933

Copyright: 1983

Cover Price: \$19.95; a program disk is available for \$100.

ISBN: 0-916106-03-9

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gram and associated files consume most of a 360K floppy. *WordMARC* nicely supports DOS pathnames, and it works best on a hard disk system.

Simple use of the system doesn't require any special work, but accessing its Greek and math character set requires special installation. The installation section of the manual is 30 pages long, and you must also peruse the 40-page "Alternate Character Guide" if you want to process equations. I thought I could get away with skipping part of the installation process, but I discovered that I had to go through it from the beginning in order to access the Greek and Math symbols.

Greek/Math Symbols

WordMARC's Greek/Math symbol set is impressive, but it's not a substitute for typeset equations. The math symbols include integrals, sums, large braces, the not-equal sign, and plus/minus sign. Though *WordMARC*'s Greek/Math character set puts this system ahead of the others for scientific applications, the missing feature is the ability to control the sizes of the characters. Without the availability of various point sizes, it's impossible to adequately enter most mathematical formulas.

You can edit *WordMARC*'s Greek/Math character set or you can create your own font. This flexibility is important for those who use unusual notation in their documents. Although *WordMARC* supports a wide range of printers, fonts that you design yourself can only be printed on an IBM Graphics Printer, an Epson FX-80 or FX-100, or an Okidata 92.

WordMARC also supports the special math printwheels of four daisywheel printers: Diablo 630 ECS, NEC Spinwriter, DEC LA100, and Qume Twin-track. Other daisywheel printers are supported for normal operations.

Subscripts and Tables

Each line in a *WordMARC* document can have up to six levels of superscripts and six levels of subscripts. You enter an equation by simply painting it on the screen, using the super and sub keys to move up and down. This keeps all of the levels of an equation on one line. If

you're in physics or math, however, you'll still need to enter complex equations by hand or send your work out to a printer.

WordMARC excels at managing data tables. The program uses ruler lines to format a region of text. You adjust the rulers to set tabs, margins, and so on. To enter a table, all you need to do is set up a ruler line with appropriate tabs. If you've made one column too narrow or too wide, you can adjust the tabs on the ruler line.

An even fancier feature enables you to

Aside from its lack of
footnote support,
WordMARC has most
standard word processing
features.

cut and paste columns of text so that you can rearrange the order of columns in a table after you've entered them.

WordMARC has decimal tabs for making numbers line up at the decimal point. The tabular-entry features would be complete if *WordMARC* offered centering tabs and right-adjusting tabs. Until it does, you'll have to be satisfied with left-aligned or numeric columns.

No Footnotes

References are an important part of most scientific papers, and you'd expect a word processor from a science software house to have footnoting capabilities. Sorry, no footnote support here. The only semblance of footnote support is the meager ability to place a superscript number in text. You'll have to settle for endnotes or else set aside space on each page and hope that nothing changes.

Aside from the lack of footnote support, *WordMARC* has most standard word processing features. It includes a spelling checker, a document encrypter, a choice of seven languages for the program's prompts, full file management from within the program, control of page headers and footers, ruler lines to control format, and support for about 70 printers. Even with such a host of features, this package is easy to use.

Now for the drawbacks. First, *WordMARC* won't scroll to an arbitrary point in your document. Each document is divided into pages, and each page is divided into screens. If the paragraph or table that you want to examine happens to straddle a screen boundary, you won't be able to view the whole thing at once. If you compose at the keyboard, this lack of single-line scrolling is a big problem.

Insert Problems


Another quibble is with *WordMARC*'s insert capability. If you move the cursor to some point in your text and start to type, you will overwrite the information that's already there. In *WordMARC*, you access the insert mode by hitting the Ins key. The right-hand part of the line will be erased, and you are free to type. When your insertion is done, you must hit Ins again to recall the end of the line and fix up the bottom of the paragraph. My preference is to make insertion the rule, and overtype the exception.

WordMARC's documentation is well written, handsomely printed, well organized, and complete. The two major parts of the documentation are the *Self Teaching Guide* and the *User Guide*. The *Self Teaching Guide* contains 22 easy lessons. Unfortunately, it lacks an index.

The 156-page *User Guide* is organized topically—it's easy to find information, and I was able to use the package effectively by occasionally referring to the manual instead of reading it from cover to cover. The *User Guide*'s table of contents (and introduction) mentioned three appendices, which were missing in my copy. The index contains only 140 citations—it is even shorter than the table of contents. The *WordMARC* package also contains a key reference chart, a quick reference folder, and a fold-out chart of the Greek and Math symbols. The system is supplied on five diskettes.

WordMARC has a very distinctive style. The menus, commands, and manual combine to give this package a very luxurious feel, which may sometimes get in the way. It may not be a scientist's dream, but overall it is an excellent package, and its unusual equation- and table-handling abilities make it stand out in the word processing crowd. ■

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16 active aliases per station	4 cable segments: 25 feet, 50 feet,
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Translator	Operating System
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APL★PLUS/PC System requires 192K. A soft character set can be used for computers with IBM compatible graphics board. A character generator ROM or software is included for the IBM PC or selected compatibles.
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Backup of large files is mandatory. Emerald can supply you with 1/4 inch, 60 MByte, cartridge or 1/2 inch, reel-to-reel, backup systems. The 1/2 inch system can even translate your mainframe (EBDCIC) files to ASCII.



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c/o Loren D. Jones
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(701) 280-2608

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Buxton, ND 58218
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Cincinnati, OH 45201

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c/o Larry Gavin
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P.O. Box 662
North Olmsted, OH 44070

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c/o Roy McCartney
30704 Royalview Dr.
Willowick, OH 44094
(216) 944-5173

Successful Investing: Seizing the Moment

"Buy low, sell high" is good advice, but how can you pinpoint the right moment? TechniFilter's sophisticated approach to this question may set the standard by which other programs will be judged.

Suppose you have collected 500 charts of the price and volume performance of as many stocks, each plotted over the span of the past year. By scanning every single page you might identify ten stocks whose smoothed price curve has just turned from downtrend to uptrend, or from uptrend to downtrend. You could then put aside the other 490 charts and concentrate on just these ten technically interesting stocks, with the hope of buying low and selling high.

If we attacked the job in the traditional way, it would be necessary to actually examine and interpret 500 paper charts, most of which would require some laborious pencilwork to analyze.

You can computerize the graphing and sorting, using any of several programs that support technical analysis. Notable among them are Anidata's *Market Analyst*, Savant's *Technical Investor*, SUMMA's *Winning on Wall Street*, The Dow Jones Market Analyzer, and R&D Software's *Wall Street Window*.

These programs will download from

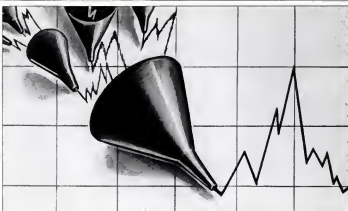


TechniFilter

RTR Software, Inc.
444 Executive Center Blvd., #225
El Paso, TX 79902
(915) 544-4397
List Price: \$299

Requires: 128K RAM and two drives, or PC-XT; DOS 2.0. Operates only on files generated with The Dow Jones Market Analyzer program.

CIRCLE 797 ON READER SERVICE CARD



commercial databases the numbers you need to recreate the hypothetical 500 charts on your PC screen.

But, as with sorting by hand, you must still spend time, on paper or on the computer screen, preparing experimental moving averages, tentative trendlines, and other lines of definition and demarcation in order to make your final choice of ten stocks.

Comparison Shopping

The ideal technical analysis program would enable you to forgo drawing analysis lines on the chart. It would use your PC's ability to calculate directly from the numbers rather than from the charts and would make all the objective and quantitative cuts so as to display only the final ten charts, speeding up the sorting process tremendously.

Some of the programs mentioned above include modules that can take this extra step for you—Anidata's *Market Analyst*, for example, is an integrated portfolio management package that includes a presort module.

TechniFilter by RTR Software, Inc., however, is a new program designed specifically to help you presort charts and apply technical analysis strategies, and as such it is a good example of how these dedicated programs work. In addition, *TechniFilter* includes a few extras that make it a standard by which to judge similar programs. For example, *TechniFilter* is a bit handier to use than *Market Analyst* because it has 48 pages of documentation to *Market Analyst*'s 2 pages.

Like any product, *TechniFilter* has its limitations. The first is its price. At \$299, this dedicated package sells for

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nearly two-thirds the price of *Market Analyst*, which is a complete, integrated package with a database. Actually, *TechniFilter* also has one severe practical limitation at the moment: It operates only on files created with *The Dow Jones Market Analyzer*, which RTR also wrote.

How It Works

TechniFilter works in two steps. First, it calculates and files values—such as today's close, or the current values of simple moving averages and/or exponential moving averages taken over several intervals (for instance, 6, 10, 12, 24, 30, or 200 days) for each stock in the system. Five hundred stocks is the upper limit.

Once these values have been calculated, *TechniFilter* can use them as the basis for a conditional screening. This second step is the "filter" of *TechniFilter*. For example, the analyst might request a list of all stocks for which the day's closing price lies above the 30-day moving average closing price. If 100 stocks met this condition, he might then stipulate a subset of stocks for which the 30-day moving average exceeds the 200-day moving average—a condition that many investors believe indicates clear sailing ahead. *TechniFilter* can also link these two conditions with a logical AND so that the screening could be accomplished in a single pass.

To help you set up the screening process, *TechniFilter* also provides a master list of 48 formulas, accessible via the programs menu. The list is a catalog of questions that can be used to construct the criteria for the screening passes. Most of the questions are comparative statements that enable you to ask, for example, if today's closing price is higher or lower than yesterday's, or if the on-balance volume is rising or falling.

Simplified Computations

TechniFilter's underlying mathematics are nicely hidden from view. To calculate the slope of a least-squares fit to a linear regression for 10 days of volume data for a given stock, you would just select or write the formula VW10, where V stands for volume and W is the designation for least-squares fit. To learn how this value compares with the same value

as it would have been reported yesterday, you would write VW10Y1, where Y1 = yesterday. I found the notation easy to learn: much of it is mnemonic or can be associated with shapes you can see on a graph: a straight line tending up, a peak, a valley, a saucer, a point sitting above or below a line.

Criteria to Watch

The combination of standard formulas and conditions enables *TechniFilter* to seek out stocks on the basis of five types of criteria: Reversal tests (has the stock price changed direction?), crossover alerts (has the stock's 10-day moving average risen above its 30-day moving average, and so forth?), tests of position within a range (has the stock broken out of its characteristic trading range? Is it approaching, to within some stipulated percentage of the range, its historic high or low?), volatility (how fast does the stock move? How frequently does it ricochet back and forth within its trading range?), and measures of position and trend (where is the stock relative to its 5-day simple moving average line? Where is the 12-day exponential average relative to the 12-day simple average?).

You can't use all 48 model formulas in a single screening operation. Instead, the user makes a selection of several formulas or writes his own, and then sets the conditions to be met by the results calculated using these formulas. If formula 1 is a calculation of the 10-day moving average and formula 2 is a calculation of a 30-day moving average, a typical condition might be set to require that the result of formula 1 must exceed that of formula 2 for the chart to be considered acceptable.

TechniFilter provides seven preset formula sets that have conditions already established as "examples." These examples, which are in fact capsule programs that will select stocks for you, can be run right out of the box or customized to meet your own technical criteria.

At the conclusion of the filtering process, *TechniFilter* produces a short list of stocks that meet the chosen criteria. You can then use one of the technical analysis graphics programs to graph these stocks and scrutinize their charts in detail.

New on the Market

HARDWARE

EIT-PS Personal Scanner

An automatic graphics digitizer and text input device that can convert drawings, photographs, typewritten documents, and other visual materials into electronic files. It incorporates both optical character recognition (OCR) and image-processing capabilities in a single device.

EIT-PS hardware consists of the desktop scanner, a half-size interface board, and a connecting cable. It has been engineered for maximum reliability, using only one moving part and a self-contained light source.

(List Price: \$2,487)

Electronic Information Technology, Inc.
373 Rte. 46 W.
Fairfield, NJ 07006
(201) 227-1447

CIRCLE 661 ON
READER SERVICE CARD



EIT-PS Personal Scanner, *Electronic Information Technology, Inc.*

Half-Height Removable Cartridge Drives

A series of 5¼-inch removable cartridge drives with storage capacities ranging from 10 to 60 megabytes. Designed to interface with standard hard and floppy disk drives, as well as the Winchester DiskSystems available from the manufacturer, the removable-cartridge drives use either an MFM or GCR encoding mode, depending upon the storage capacity of the particular unit.

(List Price: Available from the manufacturer)

P Interface Inc.
21101 Osborne At.
Canoga Pk., CA 91304

CIRCLE 662 ON
READER SERVICE CARD

MODEMPHONE

A full duplex, 300 bits/sec modem featuring a built-in telephone for voice communications. Compatible with the Bell 103 protocol,



MODEMPHONE, *Theall Engineering Co.*

the MODEMPHONE incorporates LED indicators for Data Carrier Detect, Receive Data, and Transmit Data.

The modem comes with Touch-Tone or pulse dialing capability and has a 10-number real memory.

(List Price: \$119)

Theall Engineering Co.
P.O. Box 336
Oxford, PA 19363
(215) 932-3488

CIRCLE 660 ON
READER SERVICE CARD

PC-488 Interface

An IEEE-488 interface supporting a range of programming languages to control instrumentation, printing, and plotting applications.

Built-in firmware on the half-size board supports Interpreted and Compiled BASIC; Microsoft's Pascal; C compilers from DeSmet, Microsoft, and Lattice; and assembly language. It can also accept commands from such applications as word processing software or Lotus's 1-2-3, appearing to these programs as a

standard serial port. Since the PC-488 board places no memory restrictions upon the applications programs or languages using the board's features, the entire amount of RAM in the user's system remains available to applications.

The board's firmware drivers may also be used directly by PC-DOS to transfer disk files to devices. File transfers can be done either by the user's software or directly from the keyboard with standard DOS commands such as COPY. All the board's commands and routines, however, are independent of DOS, allowing the board to be used with other operating systems such as UNIX.

Among other features of the PC-488 Interface is a proprietary command and parsing algorithm that accepts variable-string macro commands, consisting of any combination of IEEE-488 bus commands and data. This feature allows complex functions to be performed repeatedly with

single-line commands.

(List Price: \$395)

Capital Equipment Corp.

10 Evergreen Ave.

Burlington, MA 01803

(617) 273-1818

CIRCLE 659 ON
READER SERVICE CARD

NETPC/STD Interface

A local area network interface card designed for industrial control applications in hostile and/or dispersed installations, where an STD BUS device is desirable as the data acquisition device. Based on the Western Digital WD2840 VLSI LAN controller, this STD BUS-compatible interface uses a token-passing protocol similar to ARCNET and other systems, but with faster processing and noise immunity.

The circuitry incorporated on the interface card supports daisy-chaining using up to 1,000 feet of dual twisted-pair wire without repeaters. The set-up can be adapted to fiber optic, broadband CATV, or microwave link transmission installations.

A typical application for the NETPC/STD card would use a STD BUS system as a data acquisition module for a remotely located IBM PC. All of the application's software can be written on the user's system in BASIC just as if all the remote boards in the STD BUS module were located within the user's PC. Software drivers included for the IBM PC and Z-80/STD BUS systems offer C language subroutines that can be used like PEEK and



PoOS 100 Printer, Ithaca Peripherals Inc.

POKE commands in BASIC to access the remote I/O ports in the STD BUS module.

(List Price: \$495)

Beal Communications Corp.

11020 Audelia Rd., #C101

Dallas, TX 75243

(214) 340-2044

CIRCLE 658 ON
READER SERVICE CARD

PoOS 100 Printer

A dot matrix printer specifically designed to meet the needs of a computer-driven retail point-of-sales operation. The PoOS 100 Printer can be integrated with a point-of-sales system consisting of the printer, a computerized cash drawer, a PC, and appropriate software. It accepts separate receipt, journal, and inserted forms for use in customer checkout functions and can print business reports on continuous fanfold paper with up to 132 columns across.

Features of the PoOS 100 include 120 cps logic seeking, bidirectional printing, a 96-character ASCII set with a dot-addressable graphics option, both friction and tractor paper-handling mecha-

nisms, and a Centronics parallel interface. An RS-232 serial interface is also available as an option.

(List Price: \$1,795)

Ithaca Peripherals Inc.

Cornell Ind. Research Pk.

Bldg. One, Brown Rd.

Ithaca, NY 14850

(607) 257-0098

CIRCLE 657 ON
READER SERVICE CARD

Matrix PCR Slide Maker

A "desk-size" film recorder capable of reproducing computer graphics as 35mm color slides. The unit forms an image on film by producing over 4 million picture elements (pixels) on a single 35mm frame. Each of these pixels can assume any one of over 16 million colors and shades.

The clarity of the produced image is further enhanced by built-in firmware that eliminates raster lines and jagged edges from graphics screens. The raster processor also provides character fonts with programmable characteristics including proportional spacing, colored outlines, drop-shadows, and gleams.

The Matrix PCR can in-



NETPC/STD Interface, Beal Communications Corp.

THERE'S NO

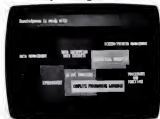
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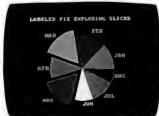
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The Knowledge Management Software
from MDBS



COMPUSTOCK,
A.S. Gibson & Sons, Inc.

COMPUSTOCK

A tool for analyzing the strengths and weaknesses of investment stocks. Using color graphics, the program identifies significant financial trends in a stock, allowing earnings and dividend rate projections to be made. Flexibility of input permits the user to vary economic criteria to determine the effect on total return for a particular stock. (List Price: \$95; demo disk, \$20)

Requires: 128K RAM, one disk drive, PC-DOS 2.x, color/graphics adapter, BASIC.
A.S. Gibson & Sons, Inc.
P.O. Box 130
Bountiful, UT 84010
(801) 298-4578

CIRCLE 648 ON
READER SERVICE CARD

Star Cal II

A programmed database of celestial events through 1990. The user can call up upcoming events for any month or specific date; data is presented in tabular form.

- Events covered include:
- lunar phases;

- lunar and solar eclipses with terrestrial locations for viewing;
- oppositions of Mars, Jupiter, and Saturn;
- annual meteor showers with expected hourly rates;
- miscellaneous events of interest (such as the opposition of Vesta, the largest asteroid).

Star Cal II also provides a real-time astronomical clock that keeps track in six international standards: local standard, local daylight, civil, local mean sidereal, Greenwich Mean Time, and Greenwich Mean sidereal. Times are continuously displayed and are accurate to within 5 seconds (assuming accurate PC time values).

(List Price: \$39.95)
Requires: 64K RAM, one disk drive, PC-DOS, BASICA or GWBASIC.
Software City
P.O. Box 11082, Sta. H
Nepean, Ontario
K2H 7T8 Canada
(613) 225-1305

CIRCLE 647 ON READER
SERVICE CARD

PresenterPC

A graphics program that offers a wide range of charting and graphics capabilities for creating slides and overhead transparencies. *PresenterPC* can tap DIF files, produced by such programs as Lotus's 1-2-3 and *VisiCalc*, to automatically generate an array of charts and graphs with up to 64 simultaneous colors. Graphics tools include two type fonts, lines,

circles, rectangles, triangles, and real-time manipulation of graphics images.

The program is menu-driven and displays a single-line help feature. A full page of documentation is also easily available for the currently active function.

(List Price: \$99.5)
Requires: 256K RAM, two disk drives, PC-DOS 2.x, color/graphics adapter.
DICOMED Corp.
12000 Portland Ave. S.
P.O. Box 246
Minneapolis, MN 55400
(612) 885-3000
Telex: 29-0837

CIRCLE 646 ON
READER SERVICE CARD

Printer Boss

A print configurator program for Epson printers. Add-on utilities available for the main shell program include a unique letter quality print mode, a RAM buffer of up to 32K, side-

ways printing of spreadsheet and ASCII files, and a choice of five downloadable character sets.

Printer Boss presents the user with a menu showing all available options for setting up a printout on Epson MX, FX, and RX printers. Add-ons include *Letterboss*, providing letter quality and printer options, and *Sideline*, for sideways printing. A separate version of the program is available for hard disk use.

(List Price: \$59.95; *Letterboss*, \$39.95; *Sideline*, \$39.95; hard disk version, \$29.95 extra)
Requires: 128K RAM, one disk drive, PC-DOS, Epson printer.
Connecticut Software Systems Corp.
30 Wilson Ave.
Rowayton, CT 06853
(203) 838-1844

CIRCLE 645 ON READER
SERVICE CARD



PresenterPC, DICOMED Corp.

New Approaches to Practicing Medicine

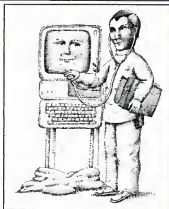
By simulating encounters with patients, CME Software brings textbook cases to life, allowing doctors to examine the consequences of a procedure without injuring the patient.

Experience is the best teacher. At some point in their training or careers, most physicians hear or read about most diseases. But the diseases they remember best are the ones they have dealt with personally. The reason is simple—a doctor is much more likely to remember actual events than a description read in a book.

CME, Inc., has created a software series that can simulate clinical experiences in order to help physicians learn about or enhance their knowledge of a particular condition.

CME is an independent entity created by the School of Medicine at the University of Washington in Seattle to produce, market, and distribute computerized medical education materials. Its programs reflect 10 years of experience in the design and use of computer-aided instructional materials. While the company's board of directors includes physicians, its executives come from the business and computer worlds.

Each program simulates an encounter with a patient who suffers from specific



complaints. When using the program, you identify and treat the medical problem presented, much as you might in a real encounter with a patient. You can learn from mistakes in this setting without harming a patient or risking a malpractice suit.

Twelve simulations are currently available; the company is producing additional cases every few months. Each case is counted as 2 Category-1 hours of continuing medical education credit by the AMA and the AAFP (American Academy of Family Physicians).

The titles available as of this writing are: *Lower Abdominal Pain in a Young Girl*, *Fatigue and Fever in a 38-Year-Old Man*, *Dysuria in a Young Woman*, *A Case of Acute Bloody Diarrhea, Respiratory Infection in a 62-Year-Old Woman*, *High Fever in a 7-Month-Old Child*,

Abdominal Cramping at 29 Weeks' Gestation, *Cardio-Pulmonary Life Support Case Simulation*, *Recurrent Otitis Media in a 17-Month-Old Child*, *A Painful Foot in a 42-Year-Old Man*, *Diarrhea and Vomiting in an Infant*, and *Chest Pain in a 30-Year-Old Man*.

Approximating Reality

I reviewed six of the simulations available. Each case begins with a short introductory screen with easy-to-follow instructions. A short history of the patient's illness follows.

This is followed by a screen that asks you to prescribe a treatment or request more information through an extensive series of branching menus, which include further history, physical findings, laboratory data, and investigational procedures.

When probing for further history, the program sometimes forces you to be so specific in your menu choices that you feel almost as if you were dealing with a real patient, except for the unrealistic brevity and accuracy of the "patient's" answers. The programs answer both appropriate and inappropriate questions, but responses to the appropriate questions include explanations of why the question was valuable, whether or not the answer gave a positive clue to the problem at hand.

The simulated results of a particular lab test are not always immediately available. Instead, as in the real world, you have to wait a realistic period of time (simulated, to be sure) before receiving an answer. In the meantime, you have to

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prescribe treatment based on what you already know. When lab results do come in, you may use the information obtained and modify treatment as indicated.

The programs also provide an option for investigational procedures. If a test is inappropriate, the program sometimes provides the results, but it always explains why the test is inappropriate.

An unexpected complication from a procedure can occur in the program, just as it might in practice. Consequently, you must be alert for a new finding that is a complication of therapy rather than part of the original problem, and you must be prepared to deal with both.

In response to the treatment you designate, the program often indicates the treatment's urgency or need and its value: positive, neutral, or negative. The case then proceeds according to the results of treatment. If you choose several selections from the menu without select-

ing all of the most appropriate choices, the program hints what your next selection should be.

End-of-Session Followup

When the session is over, you are given a score that you can compare to the

Whether or not you agree with the author's treatment, the simulations make you think.

scores of others who used the program at the University of Washington. You also receive a password that gives you access to a "teaching" section at any point in the program if you want to go through it again. (A teaching section consists of a concise but complete summary of the illness, its diagnosis and treatment, and

several pertinent references to the clinical literature.)

Finally, the program produces a code that can be returned to CME to obtain credit for completing the program. I assume the code contains the user's score and program name in encrypted form.

The quality of the programs varies somewhat; each contains a few points I might dispute. I don't think you can accept the care recommended in any of these programs as the single best way to deal with a patient.

One Case History

My specialty is pulmonary diseases, so as an example, I'll discuss the case, *Respiratory Infection in a 62-Year-Old Woman*. The problem concerns a 62-year-old female smoker, allergic to penicillin and afflicted with heart disease, though this is apparently unknown to her. The woman develops a secondary bacterial infection

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complicating a viral syndrome.

In real life, a doctor might easily treat such a patient at home with an oral antibiotic if the illness weren't too severe. In this case, the "correct" answer is to admit the patient to the hospital.

The instinct for sensing the severity of an illness that a doctor develops in medical training is important in this situation. The description of the patient, in this case and others, is not complete enough to allow you to sense the severity of the illness easily—something an experienced physician can often size up at a glance. This inadequacy might be considered a flaw of simulations in general.

As it turns out, the patient has a staphylococcal infection that requires special antibiotic therapy. Of the drugs offered for treatment, two are appropriate. Cephalixin is one of them. But 5 to 10 percent of penicillin-allergic patients are also allergic to this drug. If you choose it,

the "patient" suffers a severe allergic reaction and nearly dies.

In the program, the patient exhibits the allergic reaction every time the drug is chosen. Since this reaction occurs only 5 to 10 percent of the time in practice, the program should have simulated the reaction with the same frequency.

Finally, the patient has collected fluid in her chest cavity. The program insists that you insert a large tube into her chest to drain the fluid. Though this procedure might be necessary in practice, it would be prudent to first withdraw some of the fluid with a small needle to determine its nature. In real practice, not all collections of fluid in the chest require surgical procedures to resolve. The teaching value of the program would have been enhanced by discussing when such a procedure is indicated.

The program I've described was the weakest of those I reviewed. Despite my

negative comments, I enjoyed working with the programs. They were fun, in the way that medicine is supposed to be fun. Whether or not you agree with the author's treatment, the simulations make you think.

From Teaching to Authoring

The structure of the series seems to be a skeleton program with data files containing the appropriate information for each case. If CME were willing to provide a program to create these data files, it would make an excellent authoring system that could be used to develop medical simulations for teaching. I'm sure many medical educators and institutions would be interested in purchasing the development system to create simulations of their own choosing. ■

Bernard Friedman is a frequent contributor to PC.

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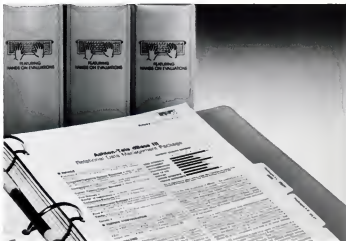
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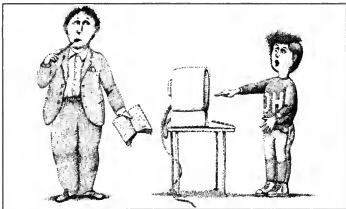
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Computerized Classroom Visions

Will the use of computers in school affect children adversely? An experienced educator says no; computers can instead enhance classroom creativity and human interaction.



Will children who spend an appreciable amount of their school time using computers turn into asocial nerds or computer zombies? Some educators and commentators think so. And it could happen if computers are dumped willy-nilly into the schools in the manner of past educational fads. In the January 1985 issue of *Whole Earth Review*, "Jerry Mander," an advertising executive, asserts, "As computers replace teachers—which will certainly happen more and more—the certainty of computer programs will replace the subtlety of human student-teacher interaction."

If you grant that Mander's rather questionable assertions are reasonable predictions you might ask, How should society avoid turning kids into extensions of the computer? How should the schools en-

hance, not diminish, the human values of the classroom?

In the first place, a computer on every desk is neither necessary nor desirable. Ranks of children keyboarding in unison in the manner of a typing class is a depressing vision that would prove an educationally counterproductive reality, one ultimately yielding the lockstep automations that Mander fears.

A look at what now goes on in many noncomputerized classrooms, however, might surprise those with romantic notions about traditional educational practices. The pressures to conform are intense and virtually irresistible. Typically, everybody is doing the same thing the same way at the same time, and heaven help the "deviants."

Far from replacing the teacher, classroom computers can increase the impor-

ance of the teacher in the educational process. The teacher I speak of, however, must be trained to exploit the potential of the computer as well as the child's potential for learning.

Computer Newspapers

In practical terms, the teacher must be able to help the class devise complex projects in which computers can play multifaceted roles as textbooks, design systems, modeling systems, and research tools. Such projects would not be lockstep regimens, but cooperative ventures. Computers are brought into play when needed, then set aside when appropriate.

The class newspaper exemplifies the kind of popular activity that has long been a staple in many schools. It certainly doesn't take a computer to put one out, but given computers, it can become a splendid enterprise. The computer-enhanced approach to this project should allow for a full range of newspaper-related activities, with detailed discussions at appropriate points along the way.

The newspaper staff (the class at large) needs to think about the nature of reporting, separation of fact and opinion, possible structures for a piece of writing, the mechanics of writing, rhetoric, typography, layout, and the many other matters associated with good journalism.

Throughout, the computers repay their cost in the same way they do at a real newspaper—by acting as word processors, typesetters, and data manipulators. And as the students use computers in these roles, they gain practical computer

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EDUCATION

fluency without suffering through make-believe, boring little exercises. They instead experience the real thing on a scale suitable to the circumstances.

The educational ramifications of the newspaper project are many, for a newspaper not only encapsulates its culture, but its production demands a variety of

Dull teachers will do dull things with the tools given to them. But why not expect humane and creative teachers to use computers to do humane and creative things in the classroom?

skills and crafts. From writing news stories, editorials, and advertisements, it is a short step to any other kind of writing the teacher wishes to explore.

All the ancillary goodies that can be added to a bare-bones word processing program can be brought effectively into play: style and spelling checkers, thesauruses, indexers, and the like.

Because a newspaper is a business, the number-manipulating capabilities of the electronic spreadsheet can also be put to use. The class must think about advertising and sales revenues, as well as production and other costs. Of course, the teacher must know something about how to use an electronic spreadsheet. But that, too, can be a cooperative learning experience in which the class—like any other organized group of people—attends to solve a problem together.

The thrust of my argument against Mander's dismal picture of the computer-tyrannized classroom is clear. Dull teachers will do dull things with the tools given to them. Tyrannical teachers will do tyrannical things. But why not expect humane and creative teachers to use computers to do humane and creative things in the classroom?

Computer-Enhanced Interaction

Let's return to the question of the "subtlety of human student-teacher in-

teraction." What exactly is this "subtlety"? Mander doesn't tell us. I understand it as emotional connections between students and teachers. The computer does not necessarily detract from these relationships and can contribute to them. A computer-enhanced project such as the theoretical school newspaper I described certainly affords many possibilities for positive interactions.

Certainties?

Mander's notion of the "certainty of computer programs" is illusory or meaningless. Yes, it is certain that a given key will move the cursor to the right one space and that another key will move the cursor to the left one space. So what? How does this kind of certainty interfere with anything that is educationally valuable? Not all programs are based on cer-

Not all programs are based on certainties. Indeed, all well-designed problem-solving software allows for the open-endedness that creative thinking demands.

tainities. Decision-making software, for example, uses the concept of weighted choice. Indeed, all well-designed problem-solving software allows for the open-endedness that creative, productive thinking demands.

Spreadsheet templates are a good example. Template design should be a cooperative exercise in which assumptions are constantly tested and design errors rectified in a brainstorming session. The computer's ability to rapidly visualize the abstract opens for the child new intellectual landscapes. The "certainty" that worries Mander doesn't exist in a meaningful way.

None of Mander's basic points—the

Henry F. Beechhold is a professor of English and chairman of the Linguistics Department at Trenton State College and the author of three books on computers in education.

child as computer zombie, the loss of student-teacher interaction, and the certainty of computer programs—has demonstrable substance. I realize that his essay is meant to be cautionary, not

necessarily predictive, but such cautions tend to fuel the fires of antitechnologists and impede progress. Let society therefore be cautious in its response to cautions. ■

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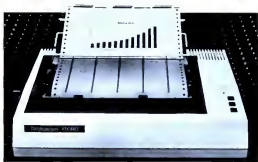
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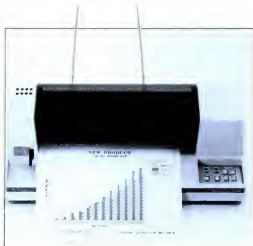
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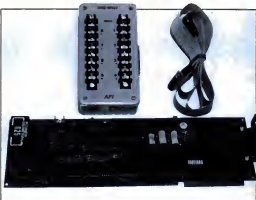
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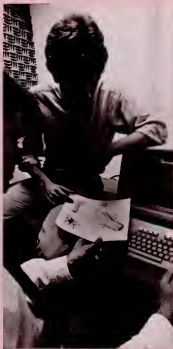
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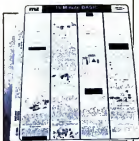
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There are vast differences in the speed and reliability of Winchester hard disks. Since the IBM PC-AT is an incredibly fast machine, a slow drive can make an AT run like an XT.

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Or better yet, buy the AT and avoid any drive with Access Times over 40 milli-seconds.

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So, even a fast drive without data protection is virtually worthless. Frankly, we'd rather sleep at night.

BEWARE OF USER-DEPENDENT PROTECTION SCHEMES.

Some drives have a safe landing zone for the heads, but you need to call a separate program to send 'em there. If you don't call that program, and most folks won't, the heads in these drives ALWAYS land on data when powered down.

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An Entrepreneurial State of Mind

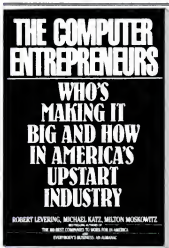
The *Computer Entrepreneurs* reads like a social register of who's who in the microcomputer industry. Over 60 men and women reveal how they became millionaires in just a few short years.

Sixty-five top achievers—the smartest, savviest, and richest—of America's hottest industry reveal how they have cashed in on the personal computer phenomenon in *The Computer Entrepreneurs*, a new book by Robert Levering, Michael Katz, and Milton Moskowitz. With backgrounds ranging from farm girl, to race car driver, to alligator wrestler, to teenage tire thief, the key figures in this collection divulge enough juicy gossip, trivia, and little-known facts to make this a richly entertaining book.

Levering, Katz, and Moskowitz profile not only the media stars you'd expect to find, but also many behind-the-scenes people whose achievements are less well known but no less spectacular. Although the authors don't reveal how they selected the 65 who made it into the book, they do recognize that for every success in this volatile industry there are hundreds of dreamers who

haven't made it out of the garage.

The entrepreneurial spirit is what sets these 65 apart: a willingness to grab opportunity, work hard, and, above all, take risks. This spirit was so integral to the early development of the



microcomputer industry that even IBM tried to foster in its Entry Systems Division in Boca Raton. A new word, *intrapreneurship*, has even been coined to describe the phenomenon whereby a large company encourages individual initiative. As Don Estridge, head of IBM's Entry Systems, puts it, "If you're competing against people who started in a garage, you have to start in a garage."

Common Denominators

The book groups the 65 subjects by their major areas of interest: hardware, software, peripherals, merchandising, information, and venture capital. In spite of these neat categories, however, the stories overlap considerably. Many of these people share common events and places, and in describing them, *The Computer Entrepreneurs* becomes, in part, a popular history of the personal computer industry.

One common denominator is the Altair computer kit from MITS, an Albuquerque, New Mexico, company. A 1975 *Popular Electronics* article on the kit is cited repeatedly throughout the book because the implications of the Altair galvanized many early computer enthusiasts, including Bill Gates of Microsoft, George Tate of Ashton-Tate, and William Millard at ComputerLand. In addition, California's Homebrew Computer Club, the first user group, was a source of camaraderie and support for several people in the book. On the East Coast, the free-thinking programmers at MIT's Computer Science Lab realized early on that there was life beyond the mainframe. Among those who got their start at MIT are Joel Berez of Infocom, the Cambridge, Massachusetts, company that created *Zork* and other interactive fiction games, and Daniel Bricklin of Software Arts, which is best known for creating *VisiCalc*.

The profiles in *The Computer Entrepreneurs* fall into an easy, almanac-like rhythm. They don't dawdle. Each opens with a list of essential biographical infor-



*The Computer Entrepreneurs:
Who's Making It Big and How in
America's Upstart Industry*

Robert Levering, Michael Katz, and
Milton Moskowitz

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BOOK REVIEW

mation, followed by a narrative summary of the events leading up to the "big break."

In addition to the standard data, the authors include a "personal transportation" category.

As with any group of wealthy people, the high-ticket European cars abound, especially the Mercedes, which is evidently de rigueur for the West Coast set. The Boston contingent favors Toyotas, Hondas, and Saabs. Those who live between the coasts go for American cars. And, of course, a few have airplanes and boats.

No Magic Formula

Personal transportation notwithstanding, the quantitative information in *The Computer Entrepreneurs* does not by itself offer insight into the microcomputer phenomenon. The 65 entrepreneurs are a diverse group that defies pigeonholing.

It's obvious that, at least in the personal computer industry, success has little to do with age. At 29, Adam Green of Software Banc, a Massachusetts company that produces software training semi-

The quantitative information in *The Computer Entrepreneurs* does not by itself offer insight into the microcomputer phenomenon.

nars, earns as much as \$25,000 for a weekend training session; Apple's 30-year-old Steve Jobs is reportedly worth \$200 million; and few need to be reminded of what Bill Gates accomplished while still a teenager. On the other hand, 66-year-old Andrew Kay had a personal

net worth of \$245 million at the time of Kaypro's public offering.

Educational backgrounds run the gamut from computer science and mathematics to psychology, philosophy, and business. Several of the entrepreneurs have Ph.D.'s, and Marty Alpert of Tecmar has a medical degree. In contrast, a few don't even have a college or high school degree. Some have sold their companies as public offerings; more have kept a tight hold on their enterprises. No perfect demographic profile or magic formula seems to exist.

A Sixties Mentality

The microcomputer boom has created a special world, the authors suggest. There are few game rules, so counter-culture types fit right in as long as they're enterprising and smart. Untethered by many of the limitations of a traditional corporate environment, these prodigies let their brains run

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Taming a Wild Language

Assembly Language Safari on the IBM PC teaches by example, while 8086/88 Assembly Language Programming stresses the basics. Used together, these books can teach you this complex language.

John Socha's *Assembly Language Safari on the IBM PC: First Explorations* takes a new approach to helping you "tame the jungle of assembly language programming." Rather than learning all about the structure and syntax of assembly language before you write code, you learn directly from the code in the book. And you don't just use random examples for each new concept; you write modules for a program, called DSKPATCH, that gradually becomes a full-screen editor for disks.

After carefully working through every exercise in the book, I could write 8088 assembly language programs, but the experience was neither painless nor easy. But then again, taming the jungle is never easy.

Safari Cartoons

Chapters 1, 2, and 3 introduce you to the all of the basics of assembly language programming. You use DEBUG to enter examples and are helped along by some wonderful safari cartoons. In fact, even

if you're familiar with assembly language basics, you should skim these chapters just for the cartoons. On the other hand, if you are a novice, you should go through this section carefully because it gives you the foundation you need for

DSKPATCH and then assembling and linking them with each new concept. Then each time you run DSKPATCH, you can see your progress. You end up with a useful program that resembles one of the *Norton Utilities*.

In Chapter 2, you work with the assembler and standard 8088 assembly language commands. Chapter 3 shows you how to use advanced features specific to the IBM PC by calling the ROM BIOS routines.

A Programming Philosophy

A crusader for modular programming, Socha shows you by example how to create a large, well-written, modular program—a new approach for an assembly language text. He pragmatically suggests that you first make your program work and then try to make it elegant. He stresses good, readable program format.

Socha's style is pleasant: He lets you try something and observe the result before he explains what the assembler actually did. He also offers good chapter overviews and summaries that help you keep your perspective.

Nothing Comes Easy

Learning any language requires effort, and assembly language, which is more compact and consequently less mnemonic and English-like than most languages, requires more work than a language such as Pascal. Socha assumes that you will precisely follow his instructions because he can't offer much help in debugging code that has errors. Consequently, when an error occurs in DSKPATCH,



assembly language programming. In the rest of Chapter 1, you use DEBUG and write short programs to print characters, to print binary and hex numbers, and one to read a character. This section ends with a discussion on using procedures and the stack to set the stage for modular programming.

Once you cover the background, you are ready to begin using the macro assembler to write programs. You do this by writing modules for the program

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Assembly Language Safari on the IBM PC: First Explorations
 John Socha
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 (301) 262-6300
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BOOK REVIEW

you're pretty much on your own. He does provide a short section on debugging that shows you how to use Int 3 to set break points, but his example is too hit-or-miss to be useful. Socha promises some new assembly language debugging techniques in a future edition of his book.

About two-thirds through the book, Socha slips in a challenge for those just itching to write their own code. He describes the procedures carefully and suggests you try them on your own. He says that when you've completed the book, even though you don't know all the 8088 instructions, you can write most assembly language programs. But he suggests you continue your safari by changing some of the DSKPATCH modules.

For \$25, you can purchase a disk to accompany the book. It includes the sample modules from the text, offers an improved version of DSKPATCH that scrolls, uses most of the function keys,

and displays a menu. This improved DSKPATCH program helps you learn to program some of the advanced features that are not included in the book. You

Socha shows you by example how to create a large, well-written modular program.

can use the disk to see what the additional features do. First try implementing them yourself, and then compare your work to Socha's.

A Companion Book

Leo Scanlon's *8086/88 Assembly Language Programming* is more traditional: It teaches you about assembly language programming before you jump in and program. It's more readable than many

other assembly language texts and makes a nice companion to Socha's book. Although it's supposedly written for beginner and intermediate-level programmers, *8086/88 Assembly Language Programming* seems to be targeted at those who already know some assembly language on either the 8088 or another chip. But, if you've worked your way through *Assembly Language Safari*, you've had the prerequisite experience.

Understanding Syntax

In Chapter 2, Scanlon introduces you to the syntax of the language. He thoroughly explains the four fields of an assembly language instruction: label, mnemonic, operand, and comment. He describes each field and the requirements, gives information about 8088 instructions, and groups instructions by types rather than alphabetically. He offers instructions for arithmetic, data

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Writing an article or a book usually takes advance planning. An outline can help you plan by organizing your ideas in a usable form. Until recently, outlining was a paper-and-pencil task that consumed an appreciable amount of your time and mental energy. New software programs for the PC, called idea processors or mindware, are now available to help. One of these is *ThinkTank*—a program that can ease the process of organizing your thoughts, save time in the planning phases, and help produce more logically structured writing.

Instead of processing words, *ThinkTank* helps process ideas. (For another view of *ThinkTank*, see the sidebar "The Original Recipe" in "Get Smart with *MacThink*," this issue). At the simplest level, it can be described as an out-

line creator. But that's like calling a computer a fancy typewriter. Just as word processing lets you add, delete, alter, and move words on screen, coming closer to transferring your thoughts directly to paper without retyping draft after draft, an idea processor lets you enter ideas into the computer and reorganize them in a logical way to produce sensible text. If you tried this with a word processor, you would spend a lot of time doing the electronic equivalent of note shuffling.

System Features

If you've ever created an outline for a speech or paper, you'll have no trouble understanding the concept and use of *ThinkTank*. Starting with a blank screen, you enter topics and subtopics using a combination of text and cursor move-

ment keys. Each successive sublevel is indented just as it would be in an outline on paper. Each line, called a "headline," can have one or more paragraphs of explanatory text attached. You can expand or collapse the outline on screen to display an overview of just the main topics or of everything you have input.

You can enter ideas as fast as they come to mind and as fast as your fingers can type, without worrying about logical order. If you decide one topic belongs in another part of the outline, you pick it up with the cursor and move it. In *ThinkTank* the particular item being moved accompanies your cursor so you can try it out any place in the outline. Other text editing features—such as search, exchange, copy, and block move—are similar to typical word processing commands. You can alphabetize a list of items, a task few word processors can handle. Another feature, merge, lets you turn the outline into one long piece of text. In this sense, *ThinkTank* could serve as a word processor, but this is neither its purpose nor its strength.

Creating an Outline

I used *ThinkTank* in combination with *WordStar* to write this article. The entire process took 50 percent less time than a similar article I did 6 months ago. I loaded *ThinkTank* and followed the menu commands for creating a new outline. Outline files use ordinary DOS names without extensions. I named my new outline *ThinkPC*. Then I started listing ideas as they occurred to me. This is how my initial outline looked:

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- + Article Title—
The Organized Writer
- Introduction
- Idea processors
- Overview of ThinkTank
- Menus
- Using program
- System requirements
- Advantages
- Problems
- Cursor movements
- Summary

At this point, I had only entered one main topic with ten subtopics. The (+) and (-) symbols beginning each headline indicate the presence or absence of sublevels. Once the basic outline structure is set, you can begin to get more specific. *ThinkTank* includes a good screen editor. You can insert or delete words using the PC's Ins and Del keys, and the text will automatically reformat. The cursor control keys move up, down, left, and right one character at a time; the Ctrl cursor key combination moves left and right one word at a time. The Home and End keys move you to the beginning or the end of a line, respectively.

If you've written several paragraphs under one subject heading and want to copy or delete a paragraph or change the order, an editing command, SELECT, can be used to mark blocks of text. If you've forgotten where a key word is or want to change terms throughout the text, the search-and-find or search-and-replace options can be accessed from a menu or with an Alt key combination.

In this case, I took the main headings in my outline and listed under each one the subtopics I considered important. By not having to write specific text at this stage, I was able to list items as fast as they occurred to me. Parts of the outline quickly developed three levels, for example:

- + Article Title
The Organized Writer
- Introduction
- Concept of 'idea processors'
- + Overview of ThinkTank
- System requirements
- Features
- + Using program

Don't Stop Now

When you have finished making an outline, it's time to start writing. Lead sentences come first, and, if you get on a roll, lead paragraphs can be written under each heading and subheading. While still in *ThinkTank*, I wrote the first sentence of each of the paragraphs you're reading. In some instances, to avoid losing an idea, I wrote an entire paragraph or more.

If the screen starts getting cluttered with all this text, and you want to see an overview of the original outline, pressing F7 makes each paragraph or headline vanish. The first time this happens you may panic—are your words still around somewhere? But the same keys that compress the text will expand it back into view.

The Next Step

When you've finished the outline and as much text as you wish to include, you have several options. You can save the material in a compressed format so that you can recall it later, or you can use *ThinkTank*'s print formatting features to print the outline.

Another option is to transfer the outline to a DOS text file. This step will allow you to work with word processing software that does not use *WordStar*-compatible processing commands. If you use *WordStar* or another compatible program, you choose an option called Wordprocessor. This choice will produce text with soft carriage returns for final writing and editing.

A well-thought-out and organized outline is a prerequisite for good explanatory or descriptive writing. And using the computer's capabilities to produce and modify outlines is a natural extension of electronic writing. Planning an article or book in advance can save the time that would otherwise be spent staring at the screen trying to organize your ideas into some coherent order and transfer them to the computer.

Ease of Use

Using *ThinkTank* can sometimes be problematic. Its many control-function key sequences can make the program work rapidly for you, but you'll need to

use them frequently to remember the keystrokes. While some are mnemonic, the same letters control different functions depending on what menu is active at the time. The menu-driven approach works well, but it is slower. Using it, you move the cursor with the space bar or left and right cursor keys to the desired command and press Enter.

The most awkward feature, which definitely takes getting used to, is *ThinkTank*'s use of the numeric-keypad cursor movement keys. Their function is not always intuitively obvious. For example, the left-cursor key will move the cursor up to the preceding headline, while the right-cursor key will move the cursor down to the next headline. I kept trying to use the up and down cursor keys to move up and down. These keys will change your position, but to the next headline that is at the same level of detail as your present position—which may be lines or even screens earlier or later in the outline.

These problems are not major. Any experienced *WordStar* user will remember the awkwardness of learning three-key control sequences, for instance. Once learned, however, these commands become second nature and are a worthwhile trade-off for the power of the program.

ThinkTank's strong point is its ability to let you capture your ideas as they come, in any sort of free-wheeling, brainstorming manner, and then reorganize these random thoughts into a form that can become a coherent speech, article, book or presentation. You could do a lot of this with a word processor—but you probably wouldn't because it would be too much trouble. With *ThinkTank*, it's not much trouble—it's fun! ■



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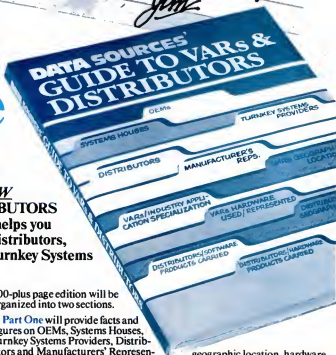
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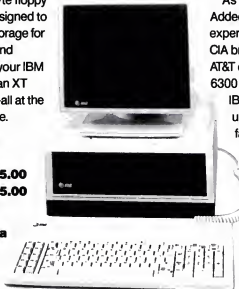
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Canada S4P 1C4

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**The Personal Computer Club of
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This is the final appearance of Club News. A complete, updated list of user group names and addresses will be available on PC's Interactive Reader Service bulletin board at (212) 696-0360. The bulletin board operates 24 hours a day, at 1200 baud, no parity, 8 data bits, and 1 stop bit (1200,N,8,1).

Because of the surge of interest in PC's Interactive Reader Service bulletin board (and bulletin boards in general), in the next issue, this space will contain a one-time list of some of the top IBM-PC and PC-compatible bulletin boards across the nation.

Two issues from now, PC will begin running its popular Spreadsheet Clinic on a continuing basis, edited by contributing editor Jared Taylor. If you have any helpful spreadsheet hints, tips, macros, or shortcuts, send them in to Mr. Taylor. We'll pay \$50 for any ideas we publish—plus a \$25 bonus if you send them to us on a disk, by MCI mail, or through PC's Interactive Reader Service bulletin board.

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Making Book With Word Processing

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I recently finished my first book. The subject was computers, the illustrations were drawn by a computer buff, and the text was written, of course, on a word processor. When the last chapter rolled off the printer, I carefully packaged the manuscript and sent it off to a Big Eastern Publishing House. Then, just as carefully, I uncorked a bottle of champagne to celebrate the book's completion. Before I could down two glasses of the bubbly, the editor at the publishing house called to acknowledge receipt of the package. During this conversation he casually dropped a bombshell—bound books would not be available for at least 8 months.

"What are you going to do," I screamed, "inscribe each page by hand?" He patiently explained the steps of the production cycle, starting with edi-

torial review, proceeding through copyediting, typesetting, proofreading, and indexing, and culminating with printing.

I listened without a whimper, then played my ace. Since the manuscript was already stored on electronic media—my word processing disk—we could streamline typesetting and proofreading, shaving a month off of the schedule. I would simply instruct my computer to send the word processing file to the typesetter's computer, and, voilà, one book ready for composition.

However, the publisher's production supervisor then chimed in and trumped my ace by pointing out that my 400-page manuscript switched typefaces as often as a nervous chameleon changes colors. From the typesetter's perspective, it would be just as easy to rekey the entire text. She concluded by saying that my

technological tome would have to take the conventional 8 months.

I swallowed the news reluctantly, but my fundamental question remained unanswered. Legions of writers weave books on disks. Shouldn't publishers take advantage of machine-readable formats to streamline production?

Guidelines Coming

The publisher's production people explained that they expect to establish guidelines for electronic submission of manuscripts within the calendar year. Currently, they receive less than 10 percent of the books they publish on disk, even though about 50 percent of their authors use word processors.

One book that will take the high-tech path to the print shop is a revision of a photography tutorial that has sold over a million copies. The text will be written and editorial changes made on an IBM PC. The typesetting company is geared to accept the PC disks. Capturing the text from a word processing file rather than keyboarding it into the typesetting computer should save about 2 weeks in the production cycle and another week or two in proofreading time.

According to the operations manager, the success of such an arrangement depends upon early agreement between author, publisher, and typesetter on the format of the electronic media. Word processing is of no benefit during editing and production unless everyone uses compatible computers.

Despite compatibility problems, a number of publishers do encourage au-

thors to submit manuscripts on disk in addition to supplying the conventional paper copy. One of the largest, McGraw-Hill, can handle virtually any type of word processing format. Says Stuart Rothenstein, the company's director of publishing technology, "When a manuscript has been accepted by the editorial department, we'll transmit the word processing file from the author's disk to our in-house system through a serial link. On the in-house computer, editors make changes and corrections from any of approximately 50 terminals tied to our Editorial Text Management System. The electronic output of that system goes to a composition company contracted to typeset the book."

Rothenstein didn't have precise figures on how much time McGraw-Hill saves this way, but he does cite a workbook project as an example. "With conventional typesetting, the project would have required a production cycle of 4 months. We cut that time in half by maintaining the text on a word processor and printing camera-ready copy on a laser printer."

Money for Authors

A McGraw-Hill editor says that the cost of copy editing, proofreading, and composition frequently amounts to \$10,000 for a single book. "If the author incurs those expenses by providing camera-ready copy," asserts the editor, "then we will make that money available."

That tack was taken recently by H. McGilton and R. Morgan, the authors of *Introducing the Unix System* (New York, 1983). They typeset the text themselves under the close supervision of McGraw-Hill's staff and produced camera-ready copy with a high-quality laser printer. Currently, the book ranks as the number one seller in McGraw-Hill's paperback line.

The Cutting Edge

If any one firm is sharpening the cutting edge of computing technology in publishing, you'd expect it to be the Computer Science Press. This Rockville, Maryland, publisher handles 25 titles per year. Editor-in-chief Dr. Arthur

Friedman encourages submission of manuscripts on disk. He now has four books under contract that will be delivered in electronic form, using word processing setups ranging from *Word Juggler* on an Apple to *WordStar* on an Osborne to UNIX's troff editor on a VAX. The typesetting company hired for the composition work uses conversion programs to handle all of these formats.

Despite compatibility problems, a number of publishers do encourage authors to submit their manuscripts on disk.

"If you must enter the main body of text from the keyboard during typesetting, you run the risk of introducing errors," Friedman observes. "A word processing disk eliminates these errors. We've found the major benefit from electronic media to be time and accuracy, not necessarily cost."

Other publishers reported to accept electronic media include Holt, Reinhart & Winston; Ballantine; Macmillan; Prentice-Hall; Viking Penguin; and John Wiley and Sons. Some of these firms pass along typesetting savings directly to authors. Others increase the royalty percentage. In any book contract, everything is negotiable.

Among authors who submit a word processed disk to the typesetter, the level of involvement varies widely. The compositor may simply massage the author's word processing file, inserting editorial corrections and typesetting commands. Or the author may take responsibility for embedding editorial changes and typesetting codes and delivering the word processed file prepared to produce camera-ready copy.

How many authors will be willing to tangle with cryptic typesetting codes remains to be seen. Clearly, involvement confers benefits in the areas of control, accuracy, and costs. Overseeing the typesetting of their manuscripts allows authors to exercise complete control, mitigating any unpleasant surprises. When the galley proofs of my book came

back I was dismayed to see that the typeface the publisher had chosen represented the digit zero as a spitting 'image of an upper-case letter O. This similarity leads to confusion in a computer book, forcing you to read between the lines to decipher statements like "WHILE (IO(XO) = 10) DO." Had I been more involved in the production process, this glitch might not have occurred.

A Lot of Work

Free-lance writer Owen Davies incorporated typesetting codes in his word processing file while preparing *The Omni Online Database Directory* (New York, 1983), a book he co-wrote with PC executive editor Mike Edelhart that was published by Macmillan. Davies reports that the directory went to press at least 3 weeks early because he inserted the codes in the text. He was pleased to speed up such a time-critical project, but he admits that, "I can live without doing typeset coding again."

Tim McGuire, a production supervisor at St. Martin's Press, sides with Davies on that point. "We still have writers who write in longhand and hire a secretary for typing. They're not going to want to get involved with typesetting." Of St. Martin's 175 annual titles, he says, only 3 books, "authored by sophisticated computer jocks," were delivered electronically.

"Our experience has shown that a captured keystroke saves only 15 to 25 percent of a typesetter's billed costs," McGuire concludes. "At \$6 to \$8 per page for an average fiction novel, we're not talking about a whole lot of money."

Nevertheless, wordsmiths should be aware that the disk they toiled over needn't be filed away once the manuscript has been shipped to the publisher. If you're publishing a book, check with the sponsoring editor and production supervisor. Ask if the typesetter can deal with a word processing file, and if so, what formatting techniques would streamline the typesetting process. Most importantly, write a clause in the book contract specifying that the cost savings be tacked on to the author's advance. You might even get enough to cover the expense of a champagne glass. ▀

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Microcomputer COBOL

PC Tech Journal casts its practiced eye on COBOL products in the microcomputer arena. The first of three articles examines RM COBOL from Ryan-McFarland and Realia COBOL from Realia, Inc.

CPU Accelerator Boards

Users who want to improve the PC's execution speed will be interested in two accelerator boards for the PC that actually boost the speed of the CPU. PC Tech Journal tested two such boards: the Kamerman Labs PC-Excellerator and the Orchid Technology PCTurbo-186.

Hard Disk Storage Alternative

The Bernoulli Box, an external drive system from Iomega has two 8-inch cartridge drives that each store 10 megabytes of data. PC Tech Journal offers a thorough review of this unique product.

Data Security and the PC

A close look at seven encryption products for the PC—how they work and their relative cryptographic strengths.

Turbo Pascal I/O Library

The first part of this two-part article examines an I/O library that cures two of Turbo Pascal's deficiencies: file handling and screen handling. It explains when, why, and how to use the library and presents solutions to problems of handling path names, tree-structured directories, and I/O redirection. It also provides the complete source code.

C Tools

Our C expert puts seven C library products to the test.



Coming Up

Spreadsheet Face-off

Twenty-nine M.B.A. candidates from the University of Pennsylvania's Wharton School recently came to New York to meet with *PC Magazine* editors for a very unusual event: the Spreadsheet Face-off. *PC Magazine* wanted to see how quickly and how well ten teams consisting of three bright, well-trained business minds could make a spreadsheet package perform without having had any previous experience with it. The ten packages included were *Framework*, *The Smart Spreadsheet*, *PeachCalc*, *Multiplan*, *pfs:plan*, *VisiCalc*, *1-2-3*, *Symphony*, *Enable*, and *SuperCalc3*. We gave the students three problems to solve. The first two were relatively straightforward; the last, a "bear," was meant to separate the proverbial "wheat from the chaff"—and indeed, the students pulled an all-nighter trying to solve it. Our cover package will give a behind-the-scenes look at this unique contest.

We'll look at why the *Framework* team was the winner of all three problems. We'll also analyze how the packages helped or hindered the contestants. And we'll explore what the contest revealed, in general, about how spreadsheets are used as well as about how they are learned.

Decision Support Software

If you find yourself spending sleepless nights trying to make decisions, perhaps you might welcome some computerized aid from your PC. *PC Magazine* will review *Decision Aid* from Kepner-Tregoe and *Expert Choice* from Decision Support Software, which offer help to the weary decision maker by presenting a systematic approach to making decisions. We'll also help you decide which is the best system for your needs.

Omnitel Encore 1200B

The Omnitel Encore 1200B is a truly Hayes-compatible modem that is functionally equivalent to the Hayes 1200B in nearly every way—an accomplishment in itself. In fact, the Omnitel modem offers even more, including a copy of *Crosstalk XVI*, at a very reasonable price.

An Automated Archive

A digitizing camera, a PC, off-the-shelf software, videodisks, a videodisk player, and a high-resolution printer combine in a system that can help the intrepid scholar make sense of messy, disorganized archives. The system allows scholars to digitally encode, store, and retrieve any photograph, drawing, or paper document. Moreover, it has already drawn rave reviews from museum directors and other archivists. We'll show you the system at work.



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